THE BRITISH CLAY-WORKER

1899-1900

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THE
BRITISH CLAYWORKER,

THE ORGAN OF THE BRICK AND TILE TRADES.

VOL. VIII.

APRIL 15th, 1899, to MARCH 15th, 1900.

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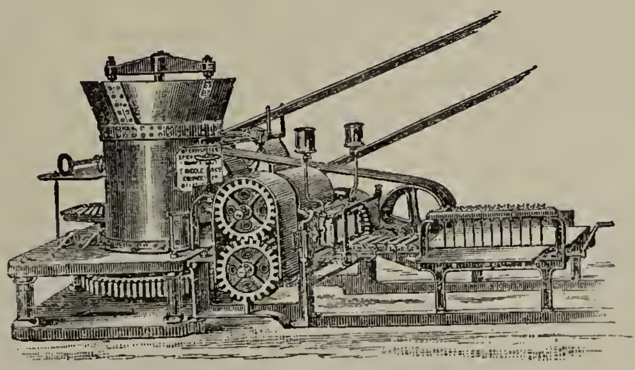

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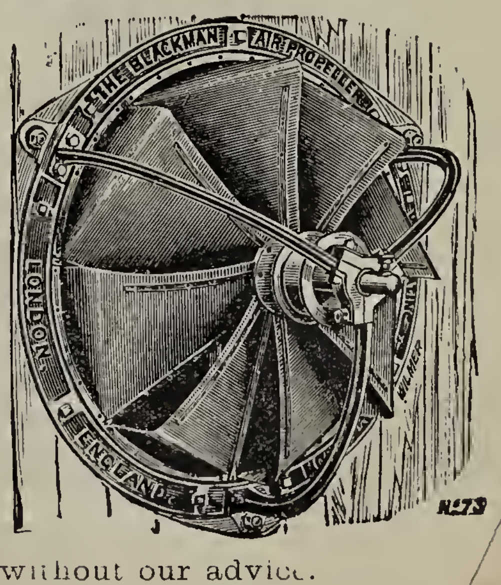

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BY THE WAY.

Many thanks to the friends who have sent us congratulations on the anniversary of our birthday. The *British Clayworker* is eight years old to-day.

* * *

Particulars of the Berlin Trip are detailed upon another page, and we shall be glad to have the names of intending travellers. The trip promises to be an exceptionally interesting one, while the social side will call forth the best sustaining powers of the party. If our readers know what German hospitality is they will sympathise with the director of the trip in the responsibility placed upon his shoulders.

* * *

In another column we give a criticism on the paper recently read before the Surveyors' Institution, entitled "The Management and Valuation of Brickfields." We hope we have not been unduly severe in our remarks, which, we need hardly say, have been actuated by no personal feeling. By the way, in a lecture with so comprehensive a title as the above, and one given before so eminent an Institution, something might surely have been said concerning brickmaking by machinery. There is still an impression abroad in certain persons' minds that *stock* brickmaking still holds the field in this country, and that its ramifications do not extend beyond the home counties. And why include the word "management" in the title of the lecture if it was never intended to touch upon this important point?

* * *

On another page we print the substance of a lecture on Terra Cotta recently delivered by Professor Roger Smith, F.R.I.B.A. It is charmingly written, and sufficiently interesting and practical to be studied by the layman, to say nothing of the worker in clay. Terra Cotta, as we have urged many a time, has a future before it and will go far in helping to make London beautiful in the coming century. Just now when the question of smoke abatement is in the air, Professor Aitchison's opinion, uttered a few days ago, on the use of terra-cotta in our towns is valuable, and coming as it does from the President of the Royal Institute of British Architects should have some weight in further developing a taste for its use among Architects. Professor Aitchison thought "it was refreshing even to think of London and other manufacturing towns presenting us with beautifully-coloured and enriched fronts that do not want painting every year," and he regrets that "coloured and glazed material for external facings, where the greatest beauty and colour of form may be used" are so rarely employed.

* * *

A Correspondent writes:—It is not often that I have sent to me such a delightful result of the labours of the scientist as the following:—

Silica	... About	65
Iron and Alumina ...	...	24
Water, &c.	...	11
		100

This came to me with a letter running somewhat in the following strain. "I have just bought a piece of ground, and thinking it might do for brickmaking, my son, who is a first-class scientist [whatever that may mean!], has made the enclosed chemical composition [*sic*]. I have heard of you as an expert in this line. Will you do me the favour of studying the chemical composition and telling me what sort of bricks it [*sic*] will make?"

This letter would take some beating, the sender being quite a stranger to me. But the finest piece of all is the "chemical composition." The "first-class scientist" must indeed be a polished scholar. We could put up with the "Silica*about* 65"—that has an air of breeziness about it which is quite rare from the scientific standpoint. The unfortunate "iron and alumina," however, must feel themselves very harshly treated. What has the alumina done that it should be bound to the iron in this fashion? It has lost even its identity. Then again, "water, &c.," is a very useful item, especially the "&c."

* * *

We were quite prepared to hear that the passion for "trusts" in America would shortly extend to the brick industry, which hitherto has escaped to any large extent the capacious maw of the capitalist.

* * *

A correspondent now sends us some information of an important move which is being conducted by the men owning vitrified brick plants in the United States. The trust is headed by Thomas B. McAvoy, Frank McAvoy, of Philadelphia, and D. V. Purington, of Chicago, Illinois, and is capitalized at £2,000,000. Several conferences have been held in camera, and the matter is now in the hands of a New York promoter, who has the support of 90 per cent. of the men. This marks an all important move that may necessitate the formation of another trust by the owners of hard salmon stretcher and pressed brick plants, in order to protect themselves against the prices governing the present output. This is controlled entirely by the Eastern, Southern, and Western States as far as Chicago, and the amalgamation of these States by the formation of a trust would so squeeze the minority as to leave it virtually in control of the market. The McAvoys have always been largely identified with the hard, stretcher, and vitrified brick-making, and are regarded as important factors, owning one yard in Philadelphia and two others up the State at Perkiomen Junction and Pine Grove, where they turn out an aggregate of 18 to 20,000,000 annually. This city demands in its specifications a somewhat larger brick than formerly; it now goes into the kiln measuring 9 × 2¾ × 4½, thus insuring the specific size 8½ × 2½ × 4½. Virtually the McAvoys control the contracts for the city, which are given out by order of the City Council.

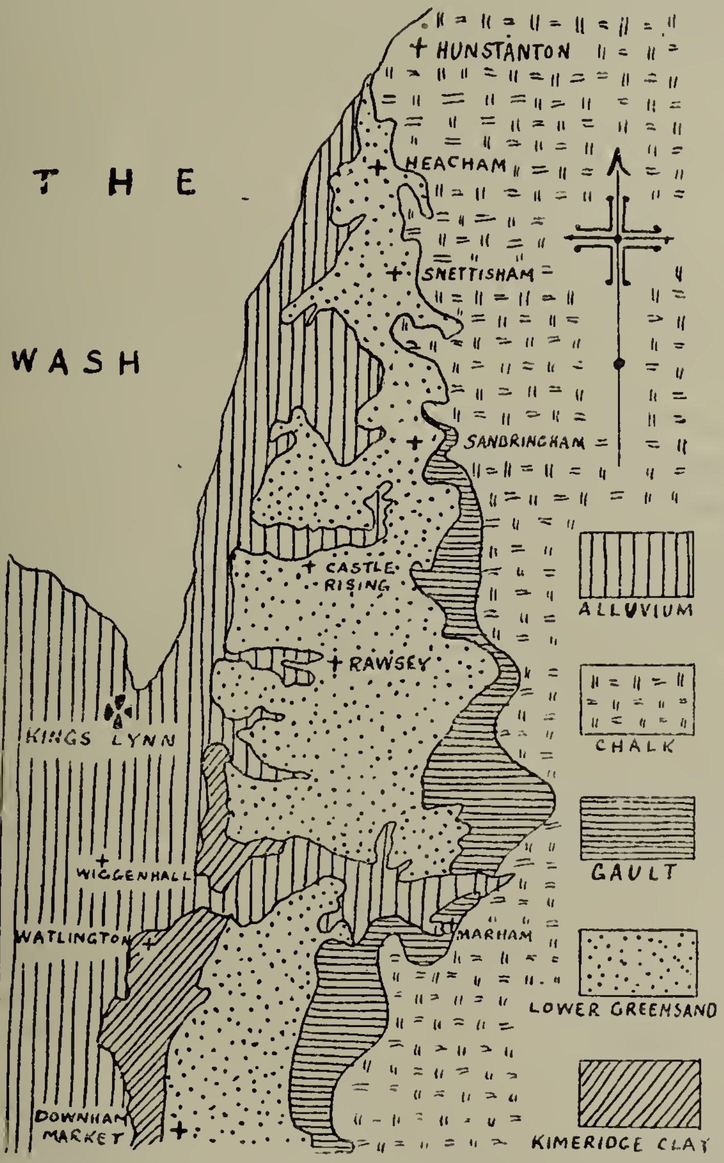
* * *

A New Brick.—We have heard of bricks made of gold platinum, manganese, chalk and mud; but the circumstance that the waste from ammonia-soda is about to be made into bricks and then to be placed before an unsuspecting public is new to us. Alkalies are good for rheumatic pains, including gout, and houses built of soda-bricks will, no doubt, be largely sought after by a large section suffering from these insidious calculous diseases. If only the painting of the interiors of these houses consisted of limewash, tempered with a little potash in places, such domiciles would be bound to fetch a good price. The method of manufacture of bricks from ammonia-soda waste is enough to startle the average brickmaker, for the material is first mixed with sand, dried, and heated on red-hot iron plates. The resulting compound is then mixed with cement and moulded. It is almost needless to mention that this invention comes from Germany.

THE BRICK-EARTHS OF GREAT BRITAIN.—XXI.

North Norfolk.

An interesting tract of country is that extending along the northernmost part of Norfolk, from Weybourn, by Wells and Burnham Westgate, to Holme and Hunstanton; but it does not call for many observations here. As will be gathered from the accompanying map, the principal geological formations concerned are the Chalk and the Drift, including boulder clay, &c., on the Chalk, Alluvium along the coast and for a short distance up some of the rivers, also shingle and blown sand. What has been previously said of the boulder clay applies to this area also. That deposit contains a considerable quantity of chalk pellets and pebbles, interspersed amongst stiff blackish clay. It is suitable for brickmaking at many points, but, of course, the presence of so much calcium carbonate renders it impossible to make a first-class brick, though many are excellent enough for ordinary building purposes. There are a few exceptions to this rule, however, and the reader must make these observations apply more particularly to the north-centre of the county than to the north-east as near Hunstanton. That town is favoured by having certain deposits of the Lower Greens and which are available for brickmaking. The alluvium referred to is, naturally, largely derived from the destruction of the Chalk and is highly calcareous. That basic property, however, is discounted to some extent by its saline character, but, except in the river valleys, as near New Walsingham, is not very suitable for clay-working purposes.



Sketch Map of North Norfolk Coast, from Weybourn to Hunstanton.

West Norfolk.

In passing from the north and centre of Norfolk to the western part of the county we are confronted by a totally different series of brick-earths and of very different geological age. In fact we have not, so far as this present series of articles has gone, alluded to brick-earths of the nature of those found in West Norfolk, and it will, therefore, be convenient to say a few preliminary words concerning their classification, which will apply also to other parts of the country.

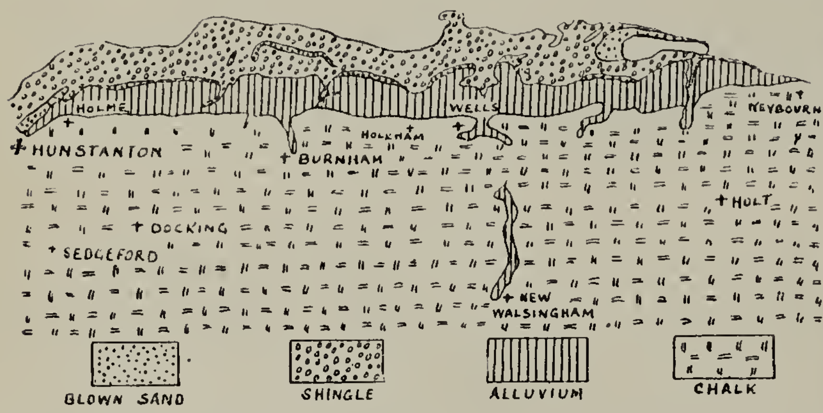
The classification of beds underlying the Chalk is, in descending order, as follows:—

1. Upper Greensand.
2. Gault Clay.
3. Lower Greensand (or Neocomian).
4. Wealden beds.
5. Purbeck beds (or Purbeckian).
6. Portland beds (or Portlandian).
7. Kimeridge beds (or Kimeridgian).
8. Coral Rag (or Corallian).
9. Oxford Clay (or Oxfordian).
10. Cornbrash.
11. Great Oolite series, including Stonesfield Slate and Bradford Clay.
12. Inferior Oolite series.
13. Lias.

The three uppermost formations and the Chalk are collectively known as the Cretaceous system; whilst the beds from the Wealden to the Lias inclusive are called Jurassic.

The only formations beneath the Chalk which crop out in West Norfolk are the Gault, Lower Greensand, and the Kimeridge Clay; but the Corallian beds are not far off. The upper Jurassic deposits are masked to a large extent by superficial beds which form a portion of the great series laid down in the Fen district, and which creeps over into Norfolk to the west of Wisbeach, extending to King's Lynn on the one hand, and to Downham Market and southwards on the other. The deposits of the Fen country will be described more particularly later on; we purpose to deal more especially at the present moment with the solid beds of the area, many of which are highly suitable for brickmaking.

A glance at our sketch map, based as before, on the official map of the geological survey, will suffice to show the general distribution of these deposits. The chalk escarpment is a sinuous line extending from Hunstanton to Stoke Ferry. It is nowhere very high, and at and to the south of the last-mentioned place is invaded by the superficial deposits. The character of the lower part of the chalk at Hunstanton is very different to that of the remainder of the formation in Norfolk, or anywhere in East Anglia or the London area. This formation is there of a reddish tint, instead of pure white or grey, and is, no doubt, in part equivalent to the Upper Greensand, and it may be to the uppermost part of the Gault also. However, we are not so much concerned with that as with the circumstance that the redness is due to iron impurity and renders the material comparatively unsuitable for brickmaking in consequence. It contains practically no flints, but is charged with innumerable hard fossils, whilst the material, as a whole, is fairly hard.



Sketch Map of the Solid and Fen Deposits in West Norfolk.

The reader will notice from our sketch map that the Gault Clay does not extend so far northwards as Hunstanton, but thins out at Sandringham; as beforementioned, however, the Red Chalk may, in part, be the equivalent to that deposit. The practical interest to us is that the portion indicated as Gault in the map is, in reality, the only part of the formation suitable *per se* for brickmaking.

The Lower Greensand in this part of the country is very different to that in South-east England. It is divided into three parts:—(1) Carstone and sand, above (2) Clay, which rests on (3) sand with a little Carstone. To the north of Sandringham the common brick-earth is the middle division, which, as we have seen, is clay. This division has not, unfortunately, any very extensive outcrop. A small patch of it exists to the South of Sandringham; but, in the greater extension to the north it has been extensively worked in brickyards at Dersingham, Snettisham, and near Heacham. At Heacham brickyard a set of beds below the Carstone is worked. The formation consists of clay, with loamy layers, and ferruginous nodules or layers, and reaches a thickness of about 30 feet, thinning southwards until it ceases to be traceable. It crops out, for the most part, on the flank of a hill, and so takes up but small space at the surface; it is at present the source of materials for brickmaking in the district. The clayworking industry is handicapped somewhat hereabouts from the circumstance that both the chalk and the Carstone are employed for building purposes. The Carstone round Hunstanton and Snettisham is a sand or grit cemented by iron-peroxide At the last-mentioned place it is regularly worked for ashlar. The clayey division of the Lower Greensand in the same locality is well exposed in the brickyard to the south of the village. Standing on top of the hill, the outcrop of this division may be easily traced by the growth of oaks, elms, &c., along the flank of the range of hills, as distinguished from the fir-growth on the sandy beds.

There is a wide expanse of the Lower Greensand for many miles to the south of Castle Rising, which is, here and there, suitable for brickmaking. The alluvium of the Wash breaks through it at Wiggenhall and on to Marham, towards Swaffham. But it comes on again to the south of that break, and continues to Hilgay, where the alluvium again gains ground.

The best brickmaking formation here, however, is the Kimeridge clay, a blue-black clay (brown at surface) containing small septarian nodules and phosphatic nodules. At several localities the crystalline form of gypsum, selenite, is developed in this clay. Speaking generally, the nodules are not abundant enough to be any very great nuisance to the brickmaker.

Croydon Blue Bricks.—We very much regret to state that the Croydon Corporation has fallen from the lofty pedestal upon which we elevated it two months ago. Vested interests, combined with ignorance and prejudice, have triumphed over the more learned custodians of the public weal, backed up by that enlightened official, the Borough Surveyor. It is in such circumstances that we feel almost inclined to the view that Bumble should be buried and even a more autocratic form of municipal government should rise from his ashes. For, in a weak moment, the Corporation has thrown aside that wise counsel which advised it to adopt blue-brick paving. During the brief period of the reign of the blue-brick, certain frontage owners were compelled to use that most excellent paving material, and when it was given up, the Roads Committee wanted to return the £931 (extra expenditure) to those aggrieved persons, but they find during the past week that they cannot legally do that. According to the local press, the faces of the frontage owners are now the same colour as the bricks. Never mind, when the people are better educated they will regret the enormous extra expenditure which will then be required to replace the miserable tar-paving of the present, with the better and more durable blue-brick.

MAGNETISM IN BRICKS:

DOES IT EXIST, AND WHAT IS ITS SIGNIFICANCE?

SOME very interesting facts have recently been brought to our notice, the existence of which has hitherto been unsuspected not only by brickmakers at large but by scientific men. This is not, perhaps, very remarkable, for until the advent of our paper the clay-working industries were entirely neglected, and even a literature of the subject was conspicuous only by its absence. Vast strides have been made since the appearance of our first number, and now, we venture to assert, few industries give more pronounced evidence of life and activity, showing that there was plenty of latent energy which only wanted development.

The facts to which we refer have just been placed on record by our enterprising Transatlantic contemporaries who thoroughly maintain the national reputation for "go-aheadedness." We do not intend to fall behind in this or any other matter, and we may say at the outset that we shall take immediate steps to test the applicability of these alleged facts to British conditions; but more of this anon.

Those brickmakers who live near such centres of learning and science generally as Cambridge, Oxford, Manchester, Edinburgh, London, Glasgow, &c., not to forget Dublin, may have marked the decided preference exhibited by the builders of laboratories, in which chemical and physical work is carried on, for bricks as a building material. Even when good stone has been available, and at cheaper rates, bricks have invariably been preferred because it is alleged that they are drier, whilst stone will hold moisture for years and never become really dry; such a condition is very disadvantageous to accurate scientific measurements and observations. If, however, certain discoveries regarding the magnetic properties of brick which have been made in America can be sustained, it would seem either that the use of bricks for scientific institutions, &c., must be abandoned, or that certain kinds of bricks exhibiting no magnetic properties must alone be employed.

A short time ago Professor Laurence, of the University of Rochester, U.S.A., in the course of some electrical experiments noticed some peculiarities in the behaviour of a magnetometer with which he was working in the basement of the laboratory, and he was quite at a loss to account for them. He tried to discover the causes of this errant behaviour, but was baffled in every direction. When visiting a friend at Ann Arbor he found that similar difficulties had also been experienced, and that investigations had only resulted in the same perplexity. At last, in the course of an after-dinner discussion, some one jokingly said that the disturbances in the instruments must have come from the building itself, and then Professor Laurence remembered that they were set up on brick piers for the sake of ensuring perfect stability.

As soon as the Professor reached Rochester he began to make some new investigations. He tried a brick against a magnetometer, and to his surprise the delicate needle backed away. He tried another and the needle backed farther. He then reversed the bricks, and in each case the needle fluttered a moment or two and then drew up. In other words he found that the bricks were actually magnets!

With the assistance of a Mr. Gage, Professor Laurence at once commenced an investigation into the magnetic behaviour of bricks of various kinds, upwards of fifty different specimens being placed under examination. Computing the "moment" of each brick as a magnet, a curve was plotted delineating the relative strength of each. A dark mottled-brown pressed brick manufactured near Rochester was found to possess the largest amount of force. Next to that came a dark pressed brick made in Washington. A series of red-baked bricks all gave the same results, being about medium in their effect upon the needle. A yellow and a white brick, also pressed, gave but little proof of magnetic influence, whilst the brick of which the Harvard Laboratory is constructed was fifth in point of strength. On a scale of 100, the mottled-red brick would reach about 80, the white pressed brick 78, the Harvard brick 32, and the others would vary between 0 and 70.

One of the bricks was found to possess absolutely no magnetism; it was white in colour. The strongest brick was equal in power to an ordinary knitting needle completely saturated with magnetism, and those who know anything about the subject are well aware that in making delicate observations such bricks in the near neighbourhood of the instruments would be very influential in disturbing effect.

Now it is very difficult indeed to assign a reason for this strange phenomenon, in the present state of our knowledge at any rate. That it is due to the presence of some form of magnetite or magnetic iron seems possible, but if this be put forward we are at once faced with the fact that if a magnet is heated to "red heat," it loses its magnetism. Then why should bricks which have, even in the commonest kinds, sustained a greater temperature still retain their magnetism, and act, indeed, exactly as magnets when placed in the neighbourhood of a magnetometer?

The American theory is that in the method of making the bricks, taken together with the compounds in the bricks' structure, may be found the secret of the magnetism. He thinks this because he found out that in two bricks which he examined the one which contained no lime possessed the greater magnetism, although its portion of iron was greater than in the other by a small fraction. Is lime, then, an "anti-magnetiser," so to speak?

The importance of this discovery can hardly be gauged at the present moment. It affects, perhaps, not only every laboratory and scientific institution in which electrical experiments are made, but also, perhaps, every wall to which telegraph and telephone wires are fixed and every house in which telegraphy and telephony are employed, to say nothing of every electric light main and station throughout the country. Are the mysterious occurrences and disturbances which take place wherever electricity is employed industrially due to the occult influences of magnetism in the bricks of which the buildings and structures are made? Every student knows that magnetism can affect and be affected by electric currents. The whole principle of the dynamo machine is built upon this fact, so that the phenomenon we are discussing is much more influential than at first sight appears. Hence, it is conceivable and, indeed, *bien possible*, as the French say, that by choosing non-magnetic bricks for certain buildings in which electricity is employed in any way we may succeed in eliminating all those disturbing influences which cause so much trouble and perplexity at the present day wherever the applications of electricity are installed.

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BOOK-KEEPING FOR BRICKMAKERS.—III.

WHAT BOOK-KEEPING WILL DO.

In order that the head office may be kept advised as to the number of bricks made, a weekly return under this head should be prepared by the works' manager. This return will vary somewhat in form, according to whether it is the custom to dry the bricks, or to place them in the kilns direct from the machines, but Form 5 is drawn up to meet either case. This return is necessary, inasmuch as it shows the quantity of bricks for disposal, and enables the head office to regulate the sales accordingly. It is also the groundwork for the preparation of cost statistics as shown hereafter.

No. 5. THE EASTVILLE BRICK COMPANY.

Return of Bricks made, and set in Kilns for the week ending...

Date.	MADE.				SET IN KILNS.					
					Kiln No. 1.		Kiln No. 2.		Kiln No. 3.	
	2⅝in.	2¾in.	3in.	Total.	No. of Chamber.	Number set.	No. of Chamber.	Number set.	No. of Chamber.	Number set.

The manager at the yard should advise the head office of the amount required for wages each week and should accompany his request by a detailed wages sheet, which may, with advantage, be drawn up in such a manner as to show the cost in wages of producing the bricks in the various stages of manufacture (Form 6). The wages sheet should of course be very carefully scrutinised on being received at the head office and any extraordinary item noted, and taken up by the principal with the works' manager. By means of an analysed wages sheet, the principal is able to see exactly how his money is being spent, and note any possibility of economising. An analysis of wages is especially necessary when new works are being started, new kilns, &c., laid down, or at a time when extensions are being made, as it is very important for a clear distinction to be made between Capital and Revenue items.

No. 6. THE EASTVILLE BRICK COMPANY.

Wages Sheet for the week ending................ ....

							ANALYSIS.											
Name of Workman.	Daywork.			Piecework.		Amount	Capital.		Revenue.									Remarks
											Burning.							
	Su. M. T. W. T. F. S.	Total.	Rate.	Work done.	Rate.	£ s. d.	Kilns. £ s. d.	Machinery and Plant. £ s. d	Work in Pit. £ s. d.	Making. £ s. d.	Kiln A £ s. d.	Kiln B £ s. d.	Kiln C £ s. d.	Loading & Stacking. £ s. d.	Engines and Boilers. £ s. d.	General Repairs. £ s. d.	Management £ s. d.	

The next important item upon which information should be required from the Works is the coal consumption. The manager should each month render a statement giving particulars of the coal used at the works, and to do this he should keep a book at the works in which he should enter details of each truck of coal received. It should afterwards be noted in the book where each truck of coal has been used. (Form 7). The statement rendered by the manager will be made up from this book, and by this means it is possible to have a fairly accurate account prepared, showing the coal used at (1) Boilers, (2) each kiln or group of kilns. By reference to Form 8 it will be seen that very valuable statistics may be arrived at by means of a carefully prepared coal return. These statistics will enable the manufacturer to compare his coal consumption month by month, and in this way the merits of the different kilns may be observed. It is obvious that information such as this is extremely useful should it happen that extensions are contemplated, and new kilns, boilers, or engines required.

No 7.

Date Received.	From whom Received.	Description of Coal.	Truck No.	Weight. T. Cwts.	Where used.							
					Kiln No. 1.		Kiln No. 2.		Kiln No. 3.		Boilers.	

In cases where several yards are owned by one firm, each yard should render separate returns on all the points before mentioned, but to avoid confusion each yard should be known by a number which should be placed prominently on the returns. Some such plan as different coloured paper to be used at each yard will help to create a clear distinction.

In turning from the consideration of the various returns to give attention to the actual accounts and book-keeping of a brick business, it should be borne in mind that the object of those controlling the head office counting house should be to "hold the reins of the business," however far they may be removed by distance from the brickfields, and it is only by means of accurate and systematic information on all the main points of manufacture that this object can be attained.

No. 8. Analysis of Coal Consumption, from.................. ....to... ....

Month.	Kiln No. 1.					Kiln No. 2.					Engines and Boilers.							
	Bricks burned.	Coal used. T. C.	Con-sumptn. per M. C. Qrs.	Coal cost. £ s. d.	Cost per M. s. d.	Bricks burned.	Coal used. T. C.	Con-sumptn. per M. C. Qrs.	Coal cost. £ s. d.	Cost per M. s. d.	Total Bricks made.	Coal used. T. C.	Con-sumptn. per M. C. Qrs.	Hours worked.	Con-sumptn. per hour C. Qrs.	Coal cost. £ s. d.	Cost per M. s. d.	Cost per hour. s. d.

The Book-keeping and Accounts.

In order to illustrate the points mentioned in connection with book-keeping, the writer has worked out a set of transactions, and illustrated them by entries in connection with the specimen rulings given. The accounts have been worked up to the close of a period in order to show how a Trial Balance, Profit and Loss Account, and Balance Sheet are prepared. The entries themselves are purely imaginary, and the figures when compared with experience may appear somewhat absurd, but it will be readily understood that they are only submitted to illustrate the method of book-keeping described.

Books of Record.

Under this head we recommend the following :—

Quotations Book.
Order Book.
Railway Rates Book.

Quotations Book.—This should be an indexed book for the purpose of recording particulars of each quotation given with details as to price, discount, carriage, carting, &c. The book will also be found to serve the purpose of a useful Customers' Address Book.

Order Book.—All orders as received, and contracts accepted, should be entered in an Order Book, showing the debit and credit account of customers in bricks. The orders as executed should be posted into this book each day from the particulars furnished in the output return previously mentioned. Such a book, though not a necessary part of the book-keeping proper, is essential for the purpose of showing the firm's commitments, and deciding on their capacity to execute further orders (Form 9).

No. 9. ORDER BOOK.

Date.	Name of Customer.	Description of Brick.	Price.	Carriage.	Discount.	Quantity ordered.	Where required.	Despatched.							
1896.								1896.							
Jan. 4	Thompson & Co.	$2\frac{5}{8}$" pressed	42/-	Paid.	Net	1 truck	King's Cross.	Jan. 5	3000						
	Harrison, J. L..........	Seconds	23/-	Forward.	$2\frac{1}{2}$%	2 trucks	Gt. Stanmore.	,, 4	3000	5	3000				
	City Gas Co.............	$2\frac{5}{8}$" pressed	36/-	Paid.	do.	2 ,,	Bishopsgate.	,, 5	6000						

Railway Rates Book.—This book should be kept for the purpose of entering agreed rates of carriage to stations in the districts where the bricks are mainly in use, and amended rates should be carefully recorded as received. Books to answer these requirements, and containing in alphabetical order the names of all the railway stations in England and Wales, are published by Messrs. Bemrose & Sons, Limited, of Derby.

Books of Account.

The following is a list of the books recommended under this head. The numbers attached to each refer to the specimens given :—

(1) Sales Day Book.
(2) Monthly Accounts Book.
(3) Invoice Book.
(4) Sales Ledger.
(5) Purchases Ledger.
(6) Impersonal Ledger.
(7) Private Ledger.
(8) Journal.
(9) Bills Receivable.
(10) General Cash Book.
(11) Petty Cash Book.

Sales Day Book.—It is usual in the brick trade to render all accounts to customers monthly, an advice note being despatched from the works at the same time as the bricks leave. (Form 10).

No. 10. ADVICE NOTE.

From the Eastville Brick Co.

..................................189..

Consignees.

Quantity.	Description of Bricks.	Railway truck number.	Consigned to.

Sent per............................Railway. Carriage paid. / forward.

The daily output return should be furnished with money columns, and completed on being received at the office. At the end of the month these daily items should be grouped together in the Sales Day Book, and each customer's total for the month should be shown therein, in one item, and posted to his account in the Sales Ledger. By adopting this method of grouping under monthly totals rather than posting daily items, a multiplicity of figures is avoided in the Sales Ledger, and the Sales Day Book forms a ready means for the preparation of the monthly accounts to be rendered to customers.

THE MANAGEMENT & VALUATION OF BRICKFIELDS.

A CRITICISM.

IN our last issue we published a report of the paper read before the Surveyors' Institute on the 20th February, under the above title, by Mr. J. L. Crouch.

Without wishing to appear hypercritical, we must say that in our opinion, it would be difficult to imagine a paper less adequate to its intended purpose and less interesting to those who are in any degree conversant with the subject.

To criticise the paper in detail and to show its shortcomings from the point of view of the brickmaker, would occupy too much space. They will, we think, be apparent to readers of our journal. But we must not let the occasion pass without some words of comment by way of protest against the lack of insight into and want of sympathy with the practical difficulties of the brickmaking trade. The author treated the brickmaker as one who should be bled to the tune of the last possible penny by the surveyor acting on behalf of the landowner, and hampered by restrictions and spied upon till he cannot call his pugmill his own.

First, let us remark on the misleading title of the paper. At the lecture our souls were illumined, during the weary two hours of paper and discussion, with the hope that we should at least glean one hint of new departure in the management of a brickfield. But, alas ! of management we heard no word, and of valuation certainly no word of value.

The author commenced with a lengthy discourse, culled from standard works of reference, on the geology of clays, analyses and treatment of china clays (which are not brick-earths, as stated in the paper), and methods of manufacture of china and earthenware. By the way, the author repudiated with some warmth the suggestion by the chairman that he had made some error in saying that 284 metres was "nearly" 310 feet. Alas for our hopes for the future of the metric system in this country ! Of course he should have said *yards*, but was perhaps quoting a misprint in one of his works of reference.

His description of "loams," given from the point of view of a geologist and not of course from that of the brickmaker, misses entirely the interesting question of *porosity* as compared with *permeability*, and both in their relation to *plasticity*. His remarks on plasticity were equally void of any symptom of intelligent comprehension. These three properties of earths are of very vital import to the brickmaker, though they are usually summed up by the practical man in a very simple manner, and they are a study of great interest, too extensive to touch on in this place.

Marls, says our author, contain a *maximum* of two per cent. of lime for brickmaking purposes. Nevertheless, the marl beloved of the London stock-brick maker contains on an average six per cent. of lime, and earths used by the White Suffolk brickmaker may contain as much as 25 per cent. of lime (45 per cent. of chalk). Later on we are told that lime will effervesce with hydrochloric acid, an error due to confusion of chalk—which is carbonate of lime—with lime, the oxide.

A method of mechanical analysis of earth is given which is bristling with inaccuracies, and the properties which such an analysis demonstrates are not even hinted at, though the method is strongly advocated. This portion of the technicalities of brickmaking again is worthy of a series of lectures to itself, and it is waste of time to touch on the fringe of the detail of such a subject in a paper of this kind.

Breaking away abruptly from science to practice, our *fin-de-siècle* author deals lengthily and tediously with the manufacture of London stocks, that pre-historic method of rule-of-thumb manufacture which produces the worst brick in the market by the most obnoxious, unskilled and antiquated method in the trade. True it is a money-making trade, *sometimes*, and for this reason our surveyor seizes on the opportunity of telling his brethren how it is done, what large profits brickmaking yields, and how to demand rents and royalties and assess the rates and values of stock-brick fields.

The actual description of the process is full of errors, too numerous to deal with here. One, however, will doubtless cause our readers a fleeting smile, where we are told that chalk is added to clay when it is *too* sandy in order to prevent it shrinking and warping !

We are told ingenuously, further on, that in some factories earth is never touched again after being dug "until completed bricks tumble out four at a time as fast as they can tumble." What simplicity ! what marvellous productiveness ! how easy ! it is small wonder that we are all overflowing with riches when we have but to turn a wheel and earth is made into bricks, worth 50/- per thousand, and made faster than one can count !

One feels inclined to drop the pen at this point and say to what further purpose can we discuss such a paper in a serious journal ? The author is a wag, and poking fun at our homely trade, let us return to our clay-pits ! But we are stopped by the reflection that the Surveyors' Institute is a serious organisation, and its doings are considered worthy of record in other journals besides our own. We must therefore go on to the end and deal with the last part of the paper which does seriously concern us.

In detailing the terms of a brickyard lease, the author bestrews at once numerous inaccuracies in our path. He says clay is usually paid for by a surface rent and a royalty. Of course, the surface rent is paid for the *brickyard*, and the *royalty* for the clay. Again, "a minimum number of bricks must be made to ensure a regular income to the lessor," whereas it is a minimum royalty that is demanded to ensure as good a return as may be reasonably expected, for the concession granted. "Royalties are paid at Michaelmas," forgetting that brickmaking is not finished for the season by that date in many cases.

The surveyor is here advised to keep his eye on the untrustworthy brickmaker, to count his stock at various times, and measure his earth-pits. Our author also objects to the practice of allowing five per cent. for waste, remarking caustically that the owner's earth is used all the same, and not only this, but the lessee should pay royalty on earth brought in from outside for any purpose ! Clayworkers are a long-suffering race, accustomed all their lives to contumely and injunctions, but even the worm must turn at last, and the lesson of the Israelites has not been lost upon us. Such terms in a lease would not, we think, find very ready acceptance. The very essence of a *royalty* charge is the principle of sharing by the landowners in the wealth made tangible by the worker from the minerals below the surface. It is obtainable, therefore, by right on the finished saleable article only on which a profit is made. Strictly speaking it should be paid on goods which are actually *sold* only, and not on manufactured stock which has not realised its profits.

The author condemns the practice of filling up excavation holes with the hard core from London dust, as being insanitary. Here we again beg to differ, for the material is porous, and open, and largely charged with fine carbon particles. It therefore becomes thoroughly oxidised and the organic matter entirely decomposed in a speedy and effectual manner. The process may not be savoury, but it is essentially hygienic and rapid. The resulting bed is dry and hard, not liable to settlements or dampness.

The notes on rating call for no remark. In the matter of valuation, however, the author speaks only for the owner, whom he would counsel to demand still more than he usually does. A royalty of 2s. 6d. per thousand is surely unheard of for stock bricks. One shilling is nearer the usual figure, and 1s. 6d. a full value. We know, of course, of royalties of 2s. near large towns, where there is no outside competition and prices obtained for bricks are high.

After discussing the items to be considered in order to arrive at a fair value for a field of brick-earth, the author sums the matter up by saying that in dealing with brick-earth one is dealing more or less for a pig in a poke. Without wishing to be discourteous we can only suggest that if surveyors *would* qualify themselves specially for dealing with the subject, which is not so simple as is usually supposed, but is bristling with technical difficulties at every turn, the problem of valuation would not appear in such an elusive light. Brick-earth is valuable and always will be valuable, but its value is of a comparatively low order, and it is enhanced solely by the sweat of man, and not by mere transference of position as is the case with such a mineral as coal. The man who chances to own the land under which clay lies, therefore, must not think he has a gold mine, or that to him belongs the exclusive right to its value so enhanced when wrought, fashioned, and rendered enduring by means of the capital and labour of the skilled manufacturer.

The following is the subject matter of the discussion which followed the reading of the above paper, fully reported in our last issue :—

Mr. J. Jopling (Fellow) said the few criticisms he would make would be based upon practical experience and not upon theory.

He agreed that analysis was very useful, but he had found that the first thing to be done was to make some practical trials with regard to any new material to be dealt with, and then, if the results were in any way difficult to account for, to go to the very best expert analyst to be found. He was no believer in amateur analyses in such cases.

With regard to the question of the rating of brickfields, he could only say that, having read the interesting paper by Mr. Boyle, Q.C., on coal mines, he thought it would be well to apply to brickfields the principle there laid down—that each separate tenement must be rated in view of its particular circumstances and surroundings. His opinion was that the proper way to rate a brickfield was to take the outgoings and receipts, and ascertain what the actual letting value of the property would be, whether it was freehold or leasehold, or under any other tenure.

With regard to the depth of clay, Mr. Crouch had, very properly he thought, said that three feet would be the extreme minimum at which it would pay to work. With that he agreed, although in a great many cases, particularly near London, the top soil for three or even four feet was all that was fit for brickmaking. And below this, in a great many cases, was gravel, and he thought it was of advantage to the property in such cases to remove the top stratum of brick-earth and then to build on the gravel. If it were necessary to go beyond that depth and to make a pit, he thought the land should not be built on at all unless the soil removed were replaced by something better than the refuse from the dust-bin.

With regard to the depth, Mr. Crouch thought it would be of advantage for the owners to have a more accurate knowledge of the depth, but it was generally to be supposed that the owners knew how to take care of themselves, and that the depth they gave was the maximum. A man wishing to let would say that he had got so many acres of splendid brick-earth, and that he had ascertained for a certain fact that it was 200 feet deep. What was the good of that? Speaking from experience, as having made some scores of millions of bricks, he said that at 30 feet depth all profitable working came to an end, and it was useless to go deeper. It might possibly pay in the case of earth producing bricks of very much better than the ordinary quality, but be had found 30 feet to be about the maximum depth to which it paid to go. One saw often, in the prospectus of a new company, a statement that the clay was, say, 200 feet in depth, which if cubed up would make so many millions of bricks, but that sort of statement did not commend itself to a practical man.

Again, there might be a deposit of most excellent clay of a fair depth, but if it were in an inaccessible place, or situate so that the cost of carriage was so great as to absorb all the profit, or if there were no market within a reasonable distance, then the clay, although of great value as clay or brick-earth, was of practically no value at all for development, and it would pay better to feed sheep on the grass over it. On the other hand there were very many cases where it would certainly pay owners of land to consider whether a portion of an estate could not be used for the purpose of brickmaking. It might help some owners out of many of their difficulties. He was very pleased indeed to find Mr. Crouch or any other gentleman (particularly a member of the Institution) giving some attention to this particular subject. It was not a very attractive subject, and one of his greatest difficulties had always been to find anyone to either help him or oppose him, or indeed to enter into the matter at all.

He thought boring was an excellent test and better than trial holes, for he had known excellent trial holes which had been dug and filled in ready for him.

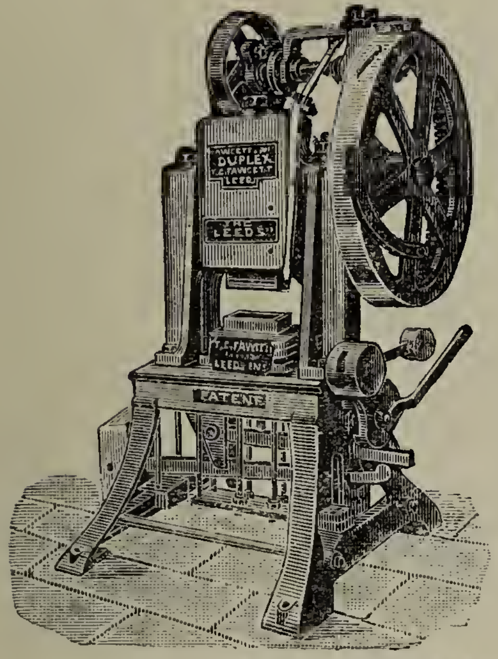
Then as to the valuation question, Mr. Crouch had rather confined himself to valuations from a freeholder's point of view, for the purpose of letting on lease. That was a very wide question. He very often had to confer with solicitors as to the best way of drawing up a lease to provide for all possible contingencies. But that was impossible, however long or comprehensive the lease might be, if people were not disposed to be honest one to another. Each case must be dealt with on its merits, and a hard and fast rule could not be applied to all cases, as no two were exactly alike.

Speaking on the prices of bricks, the author thought brickmaking very good business, and so it was sometimes, but the prices of bricks varied a good deal. Referring to the London stock-brick market, many gentlemen present could corroborate him in saying that there were times when there was a perfect rush to get the bricks, when a row of carts would be waiting at each yard to take them at £2 a thousand, while at another time they would be perhaps 21s. or 22s. a thousand, and the maker would have a good deal of trouble to sell them even at that price.

Nuisance was another question which Mr. Crouch had touched upon, and it was certainly a difficult one. He knew of no distance prescribed by law beyond which a brickfield could not be a nuisance. He thought everyone was entitled to the reasonable and comfortable enjoyment of his property, and if a nuisance were created, it did not matter whether the distance was a yard or a mile, it could be stopped.

THE "LEEDS" BRICK PRESS

With Fawcett's Patent Stopping and Dead-weight Thicknessing Motion and Differential Pressure.



This Press is very largely used for pressing glazed bricks, which require to be all of exact equal thickness. It will press about 4,000 bricks per day with one boy to operate it, and will press them all of one exact equal thickness, although the quantity of clay may vary half-a-pound; this is done by the patent compensation arrangement of bottom moveable panel with levers and weights.

It is also suitable for pressing all kinds of plain and ornamental, red and glazed bricks, tiles, and terra-cotta work.

It is also fitted with my patent differential purchase gearing, for giving double purchase while pressing the brick, which is a very necessary and advantageous feature over other Presses.

The Machine is substantially built, and of the best materials; all bearings are bushed with best gun metal, and of extra large sizes. The pressure is obtained by our well-known patent toggle-motion levers, which are all of the best crucible steel; all the working parts can be seen while the machine is at work, and are easy of access for oiling, etc. It is very easily and quickly adjusted for different thicknesses of bricks. It is also fitted with automatic gear for stopping the pressing head at the top, after pressing the brick, and automatically lifting it out of the mould ready for taking away by hand instead of by the usual pushing arm; another brick is then put on, and by moving a small handle close to the operator, the machine starts and completes another cycle of operations.

THOS. C. FAWCETT, Ltd.,
Whitehouse Engineering Works, Hunslet Road, LEEDS.

Makers of Patent Semi-Dry and Plastic Machines, Steam and Hand Presses, Pug Mills, Solid and Perforated Bottom, Clay Grinding Pans, Clay Crushing Rollers, Clay Mixers, Sieves, Engines, Shafting, and

GENERAL BRICK & CEMENT MAKING PLANT.

ILLUSTRATED CATALOGUES ON APPLICATION.

There was, he thought, nothing like the nuisance arising from brickworks where the bricks were burnt in kilns as in the case of those burnt in clamps. He wished he could see how it could be prevented, but the fact of the matter was the fuel was full of offensive matter and one could not get it out.

Mr. F. B. Buckland (Fellow) said that he did not wish to be adversely critical, but it struck him that some of the methods which Mr. Crouch had referred to were a little out of date. Steam, of course, had been in use in brickmaking for many years, for many purposes, such as driving the pug mills and wash mills, and he happened, two or three weeks ago, to visit a brickfield where he found a dynamo ready for use. He had been told since of a brickmaker who had removed all the chains which formerly drove his apparatus, and intended at once to adapt electricity to the purpose.

Reference was made by Mr. Crouch to the malm. Malm-earth, of which the best yellow bricks were made (including the rubbers and cutters), was generally found below the common brick-earth, two or three spits above the gravel. It was generally dug in to give the common bricks a better colour. If it was to be made into malm bricks the malm was washed with chalk. The malm gave a very much better skin to the common bricks, and a great many people judged very much by the skin of a brick when making a selection.

The general practice now-a-days was, that instead of the moulder following the brick-earth, the moulder's shed or stool was a permanent building, the backgrounds were made permanent, the burning grounds were permanent, and the wash mills were permanent, so that the earth alone was brought in trollies, perhaps from half a mile distant, to the wash mills and stools. That was an improvement which he thought had only within the last few years been brought into operation.

He thought it was necessary, in granting brickfield leases, to insert a clause prohibiting the lessee from using the land leased for any other purpose than as a brickfield or for agricultural purposes. It should not be allowed to be turned into a scavenger's yard, or used for depositing refuse, soft core, or other offensive matter not required for manuring the land. There should also be a clause indemnifying the freeholder from any injury accruing from the use of the land for brickmaking or otherwise.

He ought to mention the improved mode of setting bricks in clamps, which was now in vogue. Instead of their being piled, as they were a few years ago, in necks, so that the wind affected the burning of the bricks very considerably and formed openings between the necks, they were now set in such a way that the bricks supported one another, and prevented them from opening, so that there was not the loss occurring either in hard burning or in soft burning. He might mention that he had now in hand several leases of brick-earth, where the lessees were agreeing to pay down their royalty in one fixed sum instead of in varying annual instalments. This would save the lessor a considerable amount of trouble in annually checking the moulders' books and other accounts.

Mr. G. Wragge (Visitor), said he could hardly help smiling when Mr. Crouch was giving advice to the surveyors as to what they should do with regard to letting a brickfield, for his experience—his sometimes painful experience—was that all the surveyors in London whom he had met (very many of them eminent men) were perfectly able to take care of themselves and their clients, and he had listened in vain for the reader of the paper to give some hints to the poor lessee or the poor unfortunate brickmaker about to take a brickfield.

Referring to what had been said with regard to ashes, he admitted that ashes were not a very savoury subject for discussion, but he would suggest to those who had brickfields to let, and who at the same time objected to the burning of bricks in clamps, that they should endeavour to find some way by which stock brickmaking in the London districts might be done without the aid of ashes. When such a system was discovered he was perfectly certain that the brickmaker would be only too anxious to adopt it; but up to the present, in spite of their efforts and experiments, there had been no means found by which the London clay could be burnt into stock bricks without the use of ashes. Therefore he was afraid that the lessor, if he wanted to convert his brick-earth into a royalty, would have to put up with the necessary, if disagreeable, ashes.

With regard to malms, his firm were large makers of malms, and he might say that it was absolutely essential for a malm brick, which is a rubbing or cutting brick, to be washed. One could not make a malm brick out of unwashed clay. The best brick he knew of was the red rubber, made by Lawrence, of Bracknell, who washed the clay most carefully, and he thought the statement that malms were sometimes made of unwashed clay was hardly correct.

The author of the Paper had made a comparison between the low cost of the sea carriage of bricks, with the cost of railway carriage, but in all his own experience he had never yet heard of bricks being sent to Sydney, for Australia itself was, to a certain extent, a brickmaking country. Bricks could now be sent from Peterborough to London at about 10s. a thousand. If bricks were taken to Sydney they were simply carried for the purpose of stiffening the ship by acting as ballast. If one went to Trinidad, for instance, there might be seen bricks which had come over as ballast. When the custom of shipping Portland cement in casks came to be generally adopted, it was found, of course, much more easy to handle than bricks, which were not, in consequence, so much used as ballast.

With regard to the question of royalty, he understood from the author of the Paper that 2s. 6d. was generally considered a reasonable royalty. Taking the fact which the author of the Paper mentioned, and which he would accept as correct for the sake of argument, that the cost of brickmaking was somewhere between £1 and £1 1s. per thousand, this meant that the landlord was to take a profit of practically 12½ per cent. He certainly thought that unfair.

He should have liked to hear something with regard to the different sort of bricks which were being made and were coming into London at the present time, for although stocks formed a very large proportion of the bricks used during the last ten years, a new element had to be considered in the shape of machine bricks, and it would have been interesting to gather the opinion of surveyors, and architects, and engineers as to the respective merits of, for instance, Fletton pressed bricks as against stock bricks, or the bricks now coming in from the Midlands. Of course the considerations affecting the manufacture of machine-made bricks were obviously different from those in the case of stock bricks.

He had noticed that the author of the Paper began by discussing clay; from clay he went to soil, from soil to malm, and from malm he came to loam. The author's ideas as to what materials were required for brickmaking struck him as rather vague.

Mr. J. J. Robson (Visitor) said he would condense his remarks into the observation that the rent and royalty depended entirely on the site, on the district, and on the facilities for working the field. The brickmaker would take all those into consideration in forming his own conclusion as to the value of the field and the rent and royalty which he would be able to pay.

The author had spoken of the royalty as being generally paid at Michaelmas. He found it much more convenient to pay it at Christmas, as giving an opportunity for the moulders' books to be balanced up to the end of the season, which usually went beyond September.

The chief defect of the usual system of paying royalty on the moulders' books was that the brickmaker paid for the waste. He also paid for the bricks spoilt by the weather and taken back. He would suggest that this method was hardly fair to the brickmaker. He thought that in new leases royalties should be calculated on the basis of a minimum royalty for depressed times, with an increasing scale according to the price at which the bricks were sold. For instance, a shilling might be taken as the standing royalty on all bricks sold: if the price were over 25s., 3d. extra; over 30s., 6d. extra; over 35s., 9d. extra. In that way the owner of the land would get his increased share in the enhanced price of the bricks, and the royalties, instead of being calculated on the moulders' books, would be paid on the brick ledgers, plus the bricks in stock at the time and minus the number in stock in the previous year. But this system was very seldom adopted.

With reference to digging below the specified depth, the lessees should always obtain a license from the owner of the land before digging below that depth, thus guarding themselves from such a case as that which the author cited, where a claim was made for damages for digging below the agreed depth.

A great deal might be said upon the valuations of brickfields. In reality very little was known on the subject, which involved many very complicated considerations. Repeated lawsuits had been reported, and the results had not been very edifying to either side.

Reverting to the question of royalty, he might state that, in his opinion, a royalty on a good field in the country should not exceed five per cent. on the average selling price of the bricks.

With reference to the depth to which the earth might be profitably dug, he thought three feet very shallow, and he would never dream of taking a lease of land only workable to that depth. He should say the minimum should be at least four feet in order to pay for working.

Mr. Crouch in reply said that as to the rates to Australia, he was only trying to show that the railway rates were prohibitive, and that water carriage was very much cheaper than the railway. The price he had given had actually been quoted to him by a shipbroker, so that he was quite safe in saying those rates obtained in Leadenhall Street. He had only mentioned it as showing that bricks could be carried 8,000 miles by water at very much the same rate as it would cost to carry them 200 miles by rail.

CORRESPONDENCE.

To the Editor of "The British Clayworker."

Sir,—I have read with interest the article in your last issue by J. L. Crouch on "The Management and Valuation of Brickfields." Whilst admitting the general excellence of the paper and the large amount of useful information therein contained, there are several points which I don't quite see "eye-to-eye" with the writer. These may, I hope, be touched upon by you in your remarks when they appear; but there is one statement made, on which I should specially like your opinion, as it affects a large number of brickmakers. It reads:—"*Any clay brought to the ground should be treated as the lessor's, and the royalty paid accordingly.*"

This seems to be obviously a one sided and unfair view to take. Assume, for the sake of argument, that the manufacturer is getting clay from a field adjoining the one on which he pays royalty—the works are of course on the leasehold ground. Or, again, he may be importing a large quantity of clay and loam for manufacturing purposes. Of course I am willing to admit that some consideration *might* be due to the lessor, in consideration of his land being utilised for the manufacture of bricks from foreign or imported stuff; but is it not too much to expect the lessee to pay him *royalty* on clay which is not taken from his land? I shall be glad to hear your views on this matter, and also the views of other manufacturers.

Yours faithfully,
J. S. SNELL.

Tynemouth,
April 4th, 1899.

THE MANUFACTURE OF CLAY GOODS FOR ELECTRICAL PURPOSES.

Pottery, as used in connection with Electricity, may be divided, roughly, into two classes: the ornamental and the plain. The former for interiors—work of the highest class occurring in open and exposed positions. The latter—plain work for the rougher out-door necessities of the street, etc., as instanced by electric mains, conduits, and for general out-door purposes of insulation. The first type of fittings is usually in porcelain or fine earthenware, and is for the most part, glazed. The second part, particularly that intended for the street, is altogether coarser; the articles are commonly in salt-glazed stone-ware,—these are not infrequently glazed inside, the outer surfaces being dry. Such fittings are in extensive use in connection with the transmission of electricity on a large scale, these wares being made in every conceivable shape and form, to say nothing of size. Indeed, orders in pottery, for electrical purposes, may be said to run on specific lines, hence is found a painful lack of uniformity, both as regards the material and the design for work of a given character. For general purposes of electrical supply, working standards are badly needed in connection with the use of pottery; they are necessary to the electrician and potter alike. The supply must in all cases be regulated by the demand; it is therefore from the powers that be in the electrical world that such reforms must spring.

Apart from certain Essentials

perfect insulation is, of course, the primary qualification for the work. However, with the foregoing exception, it is obvious that the highest working efficiency of the before-mentioned types or classes of pottery, as appplied in their respective spheres, can hardly fall in the same plane. Fittings of an ornamental character, as used for interiors, are not exposed to such disintegrating influences: *i.e.*, to weather, smoke, fumes, etc., as are the wares used in the open; neither are such fittings used, or rarely so, in connection with large and powerful currents. Hence, apart from the one primal qualification, common to all wares without exception, as used in connection with electrical supply—that of perfect insulation—the two broadly defined classes of fittings must have certain distinctive qualities peculiar to each; which, taken collectively, are characteristic of the best work.

First, as to Insulation.

Speaking generally, there are few bodies that possess this property to greater perfection than does ordinary glass. This highly vitreous condition is, of course, impracticable in pottery; however, making all allowances for the nature of the material and for certain conditions of manufacture, the glassy or vitreous condition must, in all cases, be followed as closely as circumstances will allow. And this for several reasons which, for purposes of illustration, may be conveniently brought down to two. In the first place, a really good glass is absolutely impervious to moisture; a good glass has no interstital spaces existing side by side with the atoms or particles comprising the mass. Secondly, there are no minute nodules, say of metallic iron or similar matter, existing in an isolated condition, so to speak, in the mass. Whatever iron, etc., that may be present is, in the case of good glass, so completely fused, and so thoroughly incorporated, that the individuality of such matter is absorbed in the whole, and anything like electrical conduction is out of the question.

The Foregoing Reasons

are of a nature that no clayworker, engaged in the manufacture of pottery for electrical purposes, can afford to ignore. Let us see for a moment our grounds for this assertion. A body that is practically non-absorbent—tight, close, and semi-vitreous—is, in every way, essential, since moisture, in the case of a loose, open body, working its way insidiously round and sometimes through the various particles, filling the minute interstital spaces from its solvent action on the oxides, sulphides, etc., of the elements present, induces chemical change. Such moisture soon acquires acid properties and, with such properties, we get a corresponding rise in electrical conductivity; which, under certain conditions, may prove wasteful and destructive. Then as to the presence of accidental impurities—small nodules of iron, etc., previously referred to,—which are usually associated with loose open bodies—fire-clays of the coal measures. This, in connection with damp surroundings, in the presence of currents of high voltage and power, what might we not expect?

Durability,

under varying conditions, must also receive due attention at the hands of the clayworker. However, provided the circumstances attending perfect insulation are observed, such conditions, in themselves, can only be conducive to durability of the highest order. But as regards accuracy and close fitting, so strongly insisted upon by electricians generally, the difficulties are, in every way, intensified from the clayworker's point of view. The closer he works to the conditions necessary for perfect insulation and its concomitant quality, that of durability, so his work, in *inverse ratio*, becomes more difficult of accomplishment.

In order to get a vitreous body, clays must be used that are rich in alkalies and fine in texture; and the same must be burned at the highest temperatures used in the clayworking industry. The alkalies present in the body, that is apart from from the glaze, should not fall below three per cent., neither should they exceed four. Such a body, properly burned and thoroughly soaked at a high temperature, would yield, or give, the highest qualities in durability, and in the way of effective insulation that is possible in pottery. Such a body's composition might be given, approximately, as 75 per cent. clay substance, and 25 per cent. felspar. This must not be taken as meaning 75 per cent. clay and 25 per cent. felspar mixed; but as a rational formula deduced from the alkalies, combined water, etc., of a given clay. However excellent the foregoing composition may be, and is, for the work, it is, unfortunately only capable of limited application, The shrinkage and distortion would be too pronounced in a clay of this kind for much of the work, particularly on the large scale; hence the clayworker must perforce resort to other means in order to minimise his risks, without unduly drawing on the working qualities of his wares. But there is yet another reason why a body is sometimes used that may be most unsatisfactory from an electrical point of view, though eminently satisfactory to the clayworker. It may be that clays are used that are taken from pits on, or in the near neighbourhood of, the works. This is, indeed, a working principle peculiar to the industry. Let the order be what it will, or the working conditions of the finished wares what they may, provided the manipulative qualities of the material are equal to the demand, the clays that happen to be at hand are invariably used. Place an order, for instance, for electrical conduits of a given shape and size, with half-a-dozen firms of repute, and note the lack of agreement; no two bodies will be alike. Under these circumstances attention is more strongly called to the material, than to the methods of manufacture, wherein clayworkers are more in agreement.

In Building up a Suitable Mixture

for work of this character, there are two courses open,—that of obtaining a suitable, naturally occurring clay, similar in composition to the one given, and taking the same as the working basis of the mixture, or on the other hand, making the most of the materials at hand, by purely mechanical treatment. The first is, of course, the better method, since clays of the type given may be bought in any quantity through the usual channels. However, such clays will prove troublesome unless properly blended, mixed, and prepared, on account of their heavy shrinkage. For electrical work, apart from a semi-vitreous condition, there must be no reeky or wavey surfaces; neither must there be minute cracks or small, sharp projections on the surfaces of the wares. Dead flat surfaces, close and smooth, must be the rule. Waved or reeky surfaces are commonly the result of bad mixing or improper working—sometimes both; while the mapping or network of fine cracks are caused by the particles of cullet or rough stuff; burnt and damaged clay-wares, ground and sifted burnt clay or sand, that are mixed with the plastic clay, such particles being too large. The clay having a heavy shrinkage, it shrinks from the large rough particles; giving in effect minute cracks and rough surfaces, on account of the large and non-shrinking matter keeping their respective positions on the surfaces of the wares, and, for that matter, throughout the body generally. This latter fault, that of an improper mixture of large rough siftings with a fine and highly plastic clay, is very common—it may be frequently seen in connection with some of our best known wares. For large wares—say large conduits—a somewhat coarser mixture is, of course, necessary than for,—say small insulators; but there is really no need for the absurd extremes commonly met with. Large pieces of broken burnt material, that would lie on a sieve of twelve mesh to the inch, are not uncommon in the larger wares.

The Principles Governing

the use of burnt clay or sand with a plastic clay or clays, are not generally known. It may be taken as a safe working rule, for all mixtures and for general application, that it is best to first dry and grind the clay, afterwards sifting the same; in the case of a coarse mixture, through a ten sieve; in the case of a medium, through a twenty sieve; in the case of a fine mixture through a thirty sieve, respectively, that is, the number of holes or perforations, as expressed, to the inch. The sifted clay to be then taken, as it is, loose and dry, without the addition of water, and burnt. It should be afterwards sifted, through various sieves, until its size is determined; this, in turn, is the size of the burnt clay or sand to be used in the fabrication of the body, and in conjunction with the clay. Thus a clay which is passed through a sieve of twenty mesh to the inch, should work up well with from one-third to one-fifth its weight in burnt clay or sand, that had previously passed through a sieve of thirty mesh to the inch. Such a body, properly mixed, and treated under sound principles as regards details of manufacture, for medium size work, should prove invaluable to the clayworker and to electricians alike. So much for the preparation of the material when suitable clays, comparatively rich in alkalies, are used. Attention is now called to what may be done in connection with more refractory clays, when used in the fabrication of pottery for electrical purposes.

In spite of the Time and Money

spent on countless experiments, extending over the past fifty years, clayworkers have to reluctantly admit that there is no known method whereby alkalies may be introduced into a refractory clay in definite quantities so as to give the same properties as are found in connection with clays that may possess the same amount in alkalies, *but occurring naturally*, as opposed to direct addition. The thing has been done, with some measure of success, in very fine mixtures, by the addition of felspar or Cornish stone to the clay when in an exceedingly fine state of division, after it has been well pulverised and capable of passing an eighty mesh sieve. A highly refractory clay may be worked up with from one-third to one-fourth its weight of Cornish stone under the foregoing conditions. And this is done largely, but only in connection with fine mixtures for small work. The difficulty is to get the alkali thoroughly diffused, and in some way intimately combined with the clay substances and its constituents. If an alkali be added in solution it commonly works out as an efflorescence on the surfaces of the wares. If an alkali be introduced in the way of felspar or Cornish stone, into a loose, open, and highly refractory clay, it will simply boil out on the surfaces of the wares at a high temperature, unless the clay and stone be intimately mixed in the flour condition previously referred to. But such a fine state of division is obviously unsuitable for medium or large size wares, hence the principle is limited in its application. The only true example that can be given of the fixation of an alkali externally applied, whereby the alkali is assimilated or absorbed in the body of the wares, is that of salt-glazing; but this, unfortunately, is confined to the surfaces of the wares. Hence, a tight, semi-vitreous body, to give the glaze a substantial backing, is still essential for the work. With regard to the possible action of the current on such a glaze, and to opinions held with regard to the same, something will be said in a future paper. In showing the difficulties clayworkers have to contend with, side by side with the requirements of the electrical world, indications as to the best line of action have been given with, it is hoped, sufficient clearness as to be generally understood.

Brickworks for Sale at Blyth.—Messrs. Heatley, Heatley & Co., Auctioneers, Blyth, offered for sale at the King's Head Hotel, Blyth, the property known as Maughan's Brick and Tile Works, Blyth. There was a large attendance. Biddings were slow. A commencement was made by Mr. Charles Barron, Contractor, Blyth, with £500, which was followed by bids of £100 each, until the figure reached £900, when the property was withdrawn, the last bidder being Mr. Joseph Mitcheson, Blyth. The auctioneer stated that the mortgagee and Official Receiver were prepared to accept a reasonable offer for the premises.

Messrs. Fleming, Birkby & Goodall send us a catalogue of their belting and other manufactures, which is admirably printed and a very smart production altogether. This firm's productions are well known, and their catalogue, which contains a mass of useful information, should find a place on the table of all machine users.

THE WORLD'S PORTLAND CEMENT INDUSTRY.

IN a recent number of the journal of the Association of Engineering Societies, an account is given of the invention of hydraulic cements, dating from Smeaton's discoveries, the subsequent experiments of Vicat and Pasley and Aspdin's patent in 1824. The rise and progress of the cement manufacture in England is traced, and the author classifies the processes in use in this country under two heads. In the first group are placed the factories employing chalk in the Medway-Thames district, and in the second division he places the works using the limestone and shale of the lias formation. The English cement makers have been slow to take steps towards the amelioration of the quality of their product ; but more care is now being devoted to this matter, and the cement is improving, though there is still room for further progress. In 1895 the annual production in England was 8,300,000 barrels, or about 26 per cent. of the total European output of Portland cement. The Portland industry in France is next described, and it is stated that from 1870 onwards French cements began to steadily displace English brands in the French market, until in 1885 foreign brands of cement were almost entirely excluded. In Germany the progress of the cement trade, though for a time comparatively slow, has in recent years been beyond that of any other country, and Germany now produces more than one-third of the world's output. German factories are arranged in three groups, based on the character of the raw material employed : (1) those using chalk and clay in the north ; (2) those employing marl and clay in the south-central districts ; (3) such as make use of limestone rock of greater or less hardness. The Germans are probably the most advanced of any nation in the realisation of the great variety of uses to which cement lends itself. The German yield of cement is taken at 13,500,000 barrels annually.

		Output. *Barrels.*	*Per cent.*	*Export.* *Barrels.*
1.	Germany	13,500,000	38·4	3,000,000
2.	England	8,300,000	23·7	3,500,000
3.	France	3,000,000	8·6	1,139,000
4.	United States	2,300,000	6·6	—
5.	Belgium	2,250,000	6·4	1,500,000
6.	Russia	2,000,000	5·7	—
7.	Austria	1,000,000	2·9	—
8.	Italy	800,000	2·3	—
9.	Norway & Sweden	500,000	1·4	100,000
10.	Denmark	400,000	1·1	—
11.	All other countries (estimated)	1,000,000	2·9	—
		35,050,000	100·0	9,239,000

In a similar way the manufacture is discussed for Belgium, Austria-Hungary, Russia, Scandinavia, Switzerland, Italy, Spain, and other foreign countries. A detailed account follows of the cement industry in the United States, which is rapidly increasing. It is pointed out that, though late in the field, American makers now hold the fourth place in the world's production. The preceding table sets forth a general view of the present cement output.

TRADE IN NORTH LANCASHIRE.

THE marked improvement in the brick trade of this district which set in during 1897 was more than maintained throughout the past year, and makers were generally hard pushed with orders. Although strongly a "stone locality" for the most part there has been a growing tendency for brick to come to the front here, as in other parts of the kingdom.

The fact of stone quarried being as a rule difficult to work, and labour disputes amongst masons common, have been ruling factors in the change, together with an increased output of a superior class of bricks from the adoption of up-to-date machinery. Good brick earths are by no means common over this area, consequently it happens that carriage puts on to prices very considerably at the point of consumption in many cases, otherwise more bricks would be used. The Preston, Blackpool, and Fylde district making solely surface clay goods, by wire cut and hand, are dependent upon local demand, and this has been such as to give no cause for complaint.

At Lancaster, notwithstanding the unfortunate mason's strike which lasted some four months, the building trade was very brisk and shows no signs of slackening, houses in the town being most difficult to get.

The Corporation are annexing the outlying townships of Scotforth and Bulk and increasing the town's area from 1,680 to 6,843 acres, and as this will bring available building land into the market, there is reason to expect an even greater demand for bricks over 1899.

The rapid strides being made by the enterprising seaside resort of Morecambe close by, where brick is more extensively used than elsewhere in the district, coupled with the opening up of Heysham adjoining, due to the Midland Railway Company having made a railway to there, and now constructing a harbour, causes an extraordinary demand for both facing and common bricks in this part. A new works has been put down at White Lund, near Morecambe, by Mr. Worthington, of Blackpool, the material being surface clay and the plant wire-cut. This works will, no doubt, meet the "long-felt want" for a local yard for common bricks.

The Caton Companies in the Vale of Lune have, since the amalgamation and re-formation in 1897, under the title of The Lunesdale District Brick and Tile Company, Limited, done a very prosperous trade, the demand being beyond the capacity of their output, and prices in consequence good.

The dividend recommended to the Shareholders for the year is at the rate of 10 per cent. per annum, with a considerable addition to Reserve and good carry over.

They have recently extended their Works by putting down a Hoffmann kiln (from the plans of Mr. Warren, who has superintended its erection) and machine-house, &c. The machinery is by Whittaker & Co., Limited, of Accrington.

Mr. Hogg, of Lancaster, resigned his connection as general manager of this Company early in the year to become managing director of The Claughton Manor Brick Company, Limited, Caton, formed in April with a capital of £70,000.

This company have purchased a valuable estate of some 1,400 acres of land which is well placed for extensive development of the trade, and they intend to make a very large output.

The Barrow-in-Furness district has been exceedingly well placed for business. The town, in consequence of its important works in shipbuilding, being so busy with Government orders, has caused a large demand for labour, and houses have become scarce.

The local Brick companies amalgamated during the year under the style of The Furness Brick Company.

The brisk state of the Iron trade here accounts for much of the activity in the building trade, and the future demand for Bricks for some time seems well assured.

THE DEADLY LEAD.

A very interesting paper was read before the Society of Architects on March 1st, by Mr. Wilton P. Rix, of Newcastle, the pottery specialist, on the subject of lead-less glazes. The chair was occupied by Professor John Thomson, F.R.S.

The lecturer gave a short history of the various efforts which have been made during the past century to exclude lead from glazes, and showed specimens of pottery made without its aid, but said none of them could be considered quite successful as applied to coarse earthenware, however suitable they might be for porcelain, and apart from the results produced they did not appear to have been economical. Pottery with leadless glazes if applied to earthenware became practically a new manufacture, involving large sacrifice of plant, &c., which meant ruin to the smaller potter. Few of such glazes had survived the preliminary ordeal, and fewer still had entered the commercial stage. After noting in detail the improvements made by Mintons, Doultons, and many other firms, Mr. Rix said that, notwithstanding their apparent success, it could not be assumed that they had obtained decisive proof that the general adoption of lead-free glazes was yet possible. It must be proved whether greater expenditure in fuel was needed, and how far the more accurate control of the glaze-dipping and firing could be met. Such a change could not be made till the new product was shown to be free from increased cost of manufacture. It was therefore still necessary as a precaution, while further experience was being gained, to find the best means of reducing the necessary lead in the present glazes, and to secure the permanent fritting of the whole. The fritting of lead with silica, or borax, or stone could only produce innocuous results when the proportions of earth were such that the whole was chemically combined in a stable form. Most leadless glazes had three objectionable properties—opalinity, sluggish fusibility, and inequality of texture. Sluggish fusibility left the slightest inequality of thickness apparent after firing. The absence of lead caused the glaze to be more viscid, but it also made it slower in its response to the fusing temperature. Glazes without lead, therefore, must be dipped as thinly as possible, and much more uniformity of dipping was necessary. Surface inequality gave rise in some glazes to an egg-shell or pitted texture, depriving the ware of the smoothness essential to cleanliness. The permanence and stability of all glazes without lead was of great importance. Owing to the large place occupied by the alkalies as fusible basic substances for lead, it was easily possible to obtain combinations which would prove disastrous in this respect, for whereas lead had proved a reliable support to stability, the alkalies were notoriously treacherous. Doubtless little opportunity had occurred to thoroughly prove the latest mixtures. All that could be said was that they had stood the most severe exposure and the roughest usage without injury. It might, however, be safely stated that with the exercise of due intelligence in compounding a formula no serious risk need be incurred. The scientific data available were amply sufficient to protect the potter. The use of leadless glazes had been fitful and exceptional. Up to the present it could not be said that for the bulk of the trade they had proved practicable. Within the last five years every Staffordshire potter pronounced their adoption impossible. Since that time such advance had been made that some, at least, of the most strenuous opponents had confessed that their views were modified, and that for many classes of ware, lead was no longer a necessity. Some went so far as to think that, with increased experience, leadless glazes might become available for nearly all kinds of goods. He was inclined to believe that such a result was only a matter of time.

The Chairman (Professor John Thomson) said he was of opinion that the great variety of shades required by the public was responsible for the poisonous glazes. He trusted the public taste might be modified, perhaps on the basis of the old Eastern pottery, which was content with a more modest selection of colours. Manufacturers ought to be prevented from using glazes highly charged with lead for the sake of increasing their profits.

In the course of the discussion it was urged that the manufacture of ware with leadless glazes to any extent would not be advisable until the ware had been tested in trying climates like that of the Philippines. Doubts were expressed as to whether ware so made would stand the atmospheric conditions which prevailed in such parts of the world. It was also pointed out that workpeople were often habitually careless in observing Government regulations for their protection.

Mineral Bases of the Pottery Industry.—The centralisation of the pottery trade in the Potteries district of North Staffordshire is due to several causes, all of which are of geological origin. They have led up not only to the early initiation of this important industry, but to its retention in the district after the local material was no longer used in the larger proportion of the articles manufactured. Mr. C. E. de Rance computes that these manufactures at the present time support a population of a quarter of a million and occupy an area of no great width, but ten miles in length, and closely corresponding to the base of the upper coal measures overlying the Potteries coalfield, which is of middle coal measure age. This geological belt has been the site of pottery manufacture from prehistoric times. Ancient sepulchral urns containing calcined bones and neolithic flint implements have been from time to time dug up in North Staffordshire and North-west Derbyshire. The rise of what may be termed the pottery industry on scientific lines dates from 1686, and Burslem was its parent home. Salt glazing of earthenware was then discovered. Some few years after the brothers Elers, who came to England with William of Orange, made superior pottery in imitation of Japanese ware from the clays of Bradwell Wood, near Newport. The Elers mixed this clay with local ironstone, and made a black body of local products, which was the precursor of Wedgwood's Egyptian ware. Flints were introduced into the district in 1720 and pounded locally, plaster of Paris moulds in 1743, and the use of baryta to make a firm paste by Wedgwood, who in 1777 introduced Cornish kaolin. Some years later Spode used bone dust and felspar for soft porcelain, and local clays were only used for the earthenware cylinders, locally called "saggers," in which the china and pottery are baked. Hard porcelain was first introduced by Mr. Minton in the year 1850. The presence of the "sagger clay," in places 1,000 ft. thick, in bands of varying quality on the top of the coal measures, and the pottery fierce-burning coal lying immediately below them, undoubtedly first localised the pottery trade in the chain of the Pottery towns. Mr. de Rance remarks that most of the towns follow the geological strike of the base of the upper coal measures immediately above the Pottery coal-bearing zone, and it is a remarkable fact that this coal has retained the pottery trade within the area in question, now that the materials used in the process of manufacture are almost wholly imported from other districts.

Bothwell Park Quarries and Brickworks, Limited.—The directors have resolved to pay an interim dividend on the preference shares at the rate of 6 per cent. per annum, free of income-tax, from the dates upon which the instalments have been paid upon the shares.

Blackman Ventilating Company.—We have to acknowledge the receipt from this firm of a very charming little pocket book which it should be the ambition of every brickmaker to procure, and which we are sure could be had for the asking. It is a very handy size, bound in green cloth, and stored safely in one of its pockets is a railway insurance coupon for £500.

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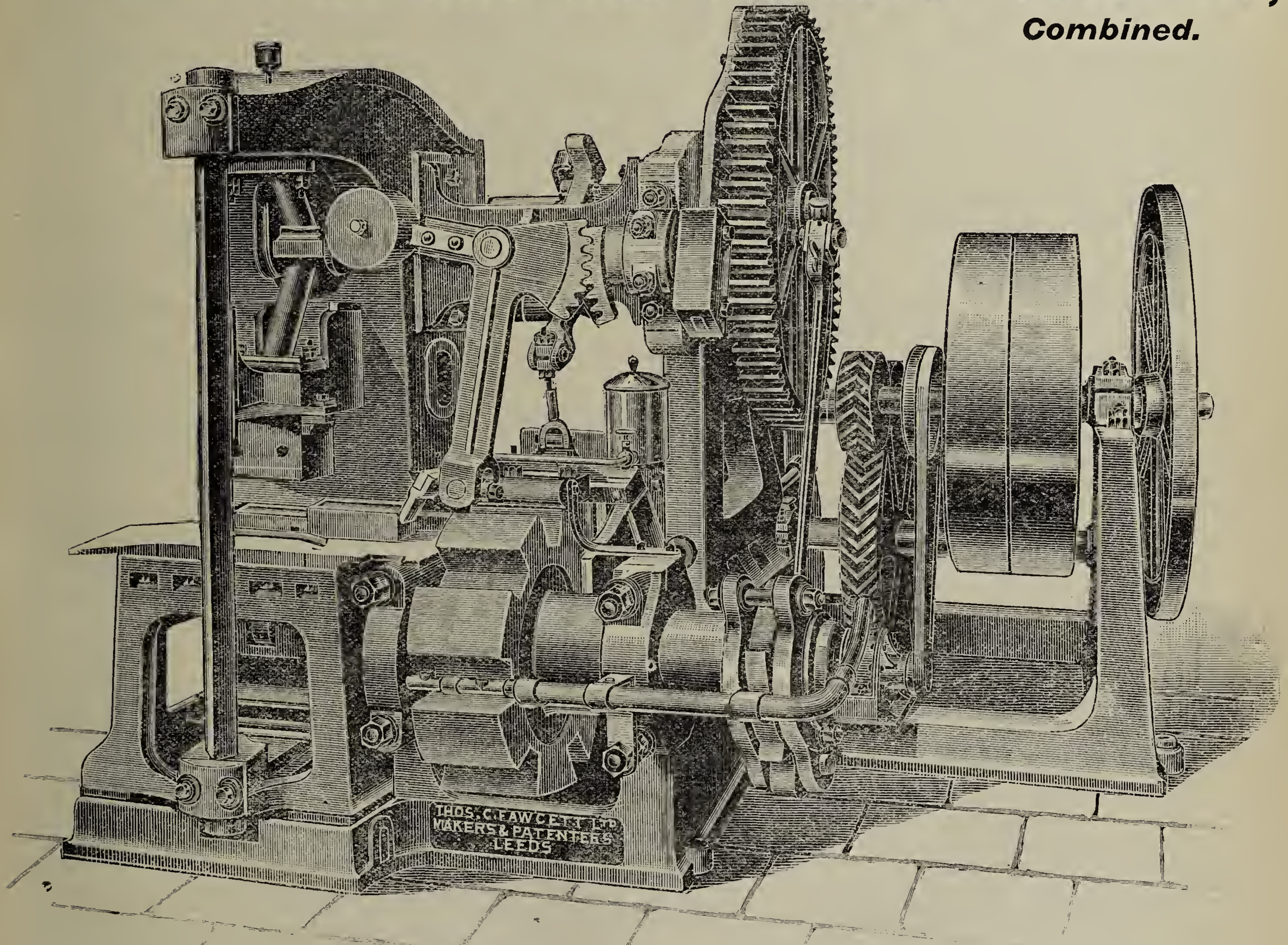

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THE BUILDING TRADES EXHIBITION.

EVERY CLAYWORKER SHOULD SEE THIS SHOW.

This Exhibition, which will be the finest of its kind ever held within the walls of the Royal Agricultural Hall, will be opened on Wednesday, April 26th, at 12 noon, by Professor Aitchison, R.A., President of the Royal Institute of British Architects. Among others who will support him on the occasion will be the Duke of Westminster, K.G., Lord Welby, G.C.B. (Chairman L.C.C.), Sir Wm. Richmond, R.A., K.C.B., Sir ArthurBlomfield, A.R.A., Sir Arthur Arnold, Sir Alfred Hickman, M.P., Sir Wm. Arrol, M.P., Sir Edwin H. Galsworthy (Chairman Metropolitan Asylums Board), Robert Vigers, Esq. (President Surveyors' Institution), G. F. Fellowes-Prynne, Esq. (President Architectural Association), J.W. Swan, Esq.,F.R.S.(President Institute of Electrical Engineers), W. H. Preece, Esq., C.B., F.R.S. (President Institute of Civil Engineers), O. Claude Robson, Esq., M.Inst.C.E. (President Incorporated Association of Municipal and County Engineers), Henry Holloway, Esq. (President Institute of Builders), Alfred Waterhouse, Esq., R.A., T. Blashill, Esq. (late Architect L.C.C.), G. F. Bodley, Esq., A.R.A., Chas. Barry, Esq., F.S.A., T. J. Bailey, Esq. (Architect L.S.B.), and most of the leading architects in London and the Provinces.

The opening, as will be seen, will be a brilliant function, while the Exhibition itself will outshine all previous attempts in this direction. Among other features of interest will be formal visits from members of the following Institutions. The Surveyors' Institution, The Architectural Association, The Society of Architects, The Institute of Builders, the Sanitary Inspectors Association, and The Association of Municipal and County Engineers. The Surveyor newspaper is controlling a road-making section which will be full of interest, and the Quarry and Builders' Merchant is inviting the trades to exhibit samples of brick and stone in the above-mentioned section. These exhibits are being shown at the nominal charge of 5s. per sample, and the scheme is being readily responded to. The Institute of Clayworkers will hold its meetings during the Exhibition (particulars are given in another column), and among other features of interest will be several conferences of the Association of Municipal and County Engineers, and a lecture on Friday, May 5th, by the Hon. Rollo Russell on the Smoke Abatement question. The Exhibition closes on Saturday, May 6th.

Some opportunities the Exhibition will afford brickmakers—

I. Of seeing a magnificent collection of clayworking and other goods and appliances.

II. Of attending the Annual Meeting and Dinner of the Institute of Clayworkers.

III. Of booking a place for the Berlin trip.

IV. Of effecting an insurance with the British Clayworkers Mutual Insurance Co.

Do not omit to make a call at the *Clayworker* office on the ground floor, or at the Welcome Club in the gallery.

CLAYWORKERS' TRIP

TO COLOGNE AND BERLIN.

As previously stated the party will leave London on Thursday, May 18th, at 8.45 p.m, after first dining together at Holborn Viaduct Hotel. The price of the Ticket will be £10, which will include ALL charges except for meals taken *en route*. This includes First-class travelling in England and Second-class in Germany (equal to English First), and covers all cost of visits to places from different centres. The hotel accommodation is the very best obtainable, and the party will travel by express trains with restaurant cars attached. The following is the suggested itinerary :—

Thursday, May 18th. Dine at Holborn 7 o'clock. Leave London.

Friday. Noon. Arrive Bochum (Westphalia) ; luncheon at Hotel. Reception and dinner in the evening at the Stadtpark, by kind invitation of Mr. Arthur Koppel of Berlin.

Saturday. Visit to brickworks ; luncheon at same. Evening leave for Cologne ; dinner at Hotel.

Sunday. Cologne.

Monday. Trip up the Rhine. Visit brickworks, then to "Vesuvius," from whence a magnificent view is obtained ; luncheon at Hotel. Return by boat in afternoon.

Tuesday. Travel to Berlin. Dinner at the Central Hotel on arrival.

Wednesday morning. Sights of Berlin. At noon, visit to Potsdam and other places.

Thursday. Visit to Clausdorf by the Military Railway (Narrow Gauge). (A special train will be provided for the party.) Visit to brickworks.

Friday. Departure from Berlin.

Saturday. Home again, 8 a.m.

This is a rough outline of the arrangements made to date. There is still some "filling in" to be done, and the complete programme of each day's excursions will be supplied to each Ticketholder. Please note that the number of Tickets to be issued is limited, and that all applications must be made not later than May 6th. Places may be booked at the Royal Agricultural Hall, and all particulars obtained during the Building Trades Exhibition, which opens on the 26th inst.

BOOKS RECEIVED.

Spon's Architect's and Builder's Price-Book.—(E. & F. N. Spon, 125, Strand, W.C.)—This book which each succeeding year serves to make still more complete and useful, has just been issued. Since the last number additional information has been added, including a chapter on electricity, and further information on concrete, fireproof floors, and granite. The book is valuable to the brickmaker as well as the builder and architect.

Laxton's Price-Book (Kelly's, High Holborn, W.C.; price, 4s.)—This is a bulky volume, revised and brought up to date, and containing valuable additional matter since its last issue. The section devoted to bricklaying is exhaustive and is of as much value to the seller of clay goods as to the purchaser.

NOTICE OF REMOVAL.

ARTHUR KOPPEL,

Manufacturer of Portable Railway Material and Wagons,

Has removed from 96, LEADENHALL STREET, E.C., to

PENINSULAR HOUSE,
MONUMENT STREET,
LONDON, E.C.

Telegraphic Address :—" ALIGHTING, LONDON."

PLEASE NOTE NEW ADDRESS ON ALL CATALOGUES AND PAMPHLETS.

INSTITUTE OF CLAYWORKERS.

ANNUAL MEETING AND DINNER.

The Annual Meeting of the Institute will be held at the Royal Agricultural Hall on Wednesday, May 3rd, at 4 o'clock in the afternoon, and will be followed by the annual dinner at 6 o'clock. Application for tickets for the latter (price 5s.) should be made to the Secretary, 43, Essex Street, W.C.

Welcome Club.

This has been fitted up for the benefit of clayworkers who will visit the Exhibition, and will be located at the east end of the gallery. Not the least interesting among its alterations will be that of a

Hundred Guinea Billiard Table,

which has been kindly placed at our disposal by Miss F. H. Ayres, of Aldersgate Street. Refreshments may be obtained in this room at reduced charges, and the Club will be free to all members of the trade on presentation of card.

EMPLOYERS' LIABILITY—A FACT TO REMEMBER.—The British Clayworkers' Mutual Insurance Corporation, Ltd., can carry your risk at a cheaper rate than ANY OTHER office, and can furnish every guarantee as to its stability. Surely it is foolishness to throw money away by insuring in other Companies, who quote high rates and give you no share in profits!

QUERIES AND REPLIES.

Preparing of Coke Breeze for Clamp.—This should be screened the same size as ordinary house ashes are for soiling—8¾in. of coke breeze are about equal to 18in. of London dust on the earth heap. The relative weights per 1000 bricks are about 3 cwt. and 7 cwt. This, of course, does not refer to the large cinders used under the clamp, but only to the soil. There is no doubt that the clamps with coke breeze want air excluded more than with house dust, as otherwise it burns more rapidly and unequally.

The Carriage of Fire Clay.—*Can any of your readers inform me if raw fire clay (as it comes out of the pit) should be carried by the Railway Co. at the same rate as coal? It is a mineral, and the same royalty is paid as for coal. Put on rail it is, however, only half the value of coal, and yet the G.W. Co. charges 30% more than for coal. Would the Board of Trade consider my case? Could the readers of the* Clayworker *advise me or help in the matter? If I could send the clay at the same rate as coal, I could find a ready market for the thousands of tons of fire clay now on my hands.—J. B.*

Machine for Spinning Straw Ropes.—*Will any reader kindly supply the writer with the address of the makers of a machine for spinning straw ropes for packing purposes? Editor has address.*

THE WORKMEN'S COMPENSATION ACT, 1897.

KILLED BY A TRUCK.

At Messrs. Horsford and Co.'s Brickfield, at Oare, near Faversham, a lad named Daniells was knocked down by a truck, and died soon afterwards.

KILLED THROUGH A FAULTY ROPE.

James William Dickerson, a brickyard labourer, died in Peterborough Infirmary on April 2nd from injuries received at the Saxon Brick Company's premises at Whittlesey on March 8th. On that date deceased was at work in the clay hole, when the rope attached to a clay wagon broke. Before he could stand clear of the line the released vehicle overtook him, knocked him down, and passed over his hips.

KILLED WHILE SHUNTING.

John Goodwin, aged 36, employed as a labourer at Mr. Itter's brickyard at King's Dyke, was knocked down by a wagon which was being shunted in the yard, and received injuries from which he died shortly afterwards.

Whilst Thomas Phillips, a labourer, engaged at Messrs, Gibbs and Co.'s Cement Works, West Thurrock, was engaged loading loam into trucks, he fell under the wheels, and four wagons, which were proceeding down an incline, passed over him, from the effects of which he subsequently died.

KILLED WHILE BLASTING WITH LOOSE POWDER.

At an inquest at the Corbett Hospital, Stourbridge, on March 21st, on the body of a miner killed by a gunpowder explosion in a clay mine, it was shown that the accident occurred while the man was putting in a shot with loose powder, and at the same time using a naked candle. The Government Inspector said there had been no breach of the Mines Regulation Act in the case, as the masters and men in the fire-clay trade had made representations to the effect that clay pits could be worked safely and more conveniently with loose gunpowder than with cartridges. The Coroner expressed surprise that any mines should have been exempted from the use of cartridges. The jury, in returning a verdict of accidental death, suggested that cartridges and lamps, instead of loose powder and naked candles, should be used in clay mines.

THE ACT AND THE LAW.

WHAT IS BEING "REPAIRED"?

In the Court of Appeal, an appeal was heard, Wood *v.* Walsh and Sons, raising the question whether the Workmen's Compensation Act applies to painters engaged in painting the outside of a house by means of ladders. The action was brought by the widow of a workman who had been killed through the breaking of a ladder on which he was standing at work. An arbitrator had held that the building was not being "repaired" within the meaning of the Act, and that the ladder on which the man was standing was not a "scaffolding" within the meaning of the Act. The county court judge reversed the decision of the arbitrator, and awarded the claimant £237 18s. agreed damages. The employers appealed, and their lordships now allowed the appeal.

WILFUL MISCONDUCT.

At the Tamworth County Court recently, a pit-boy claimed 6s. per week for life, as damages sustained whilst employed at the Hockley Hall and Whateley Hill Collieries. On September 7 last, plaintiff, who was engaged as a road-boy, went, in the course of his duty, with a pony and some full trucks of coal to a certain point, where the trucks were drawn forward by means of steam, and waited there, with other boys, for some empty trucks to take back. Whilst waiting there, plaintiff's cap slipped off his head, and as he stooped to pick it up with his right hand, his left hand, which he was holding above his head, came in contact with the travelling rope, and was carried up to a pulley, which crushed three of his fingers so severely that they had to be amputated. Mr. George Andrew Hurst, certificated manager of the colliery, stated that the boy was 21 ft. 6 in. away from where he ought to have been when the accident occurred. It was a breach of the special rules and the bye-laws for anyone to go along the haulage road. The rope was 5 ft. 1 in. from the ground; it travelled at the rate of about two and a half miles an hour. In his opinion the boy was swinging on the rope with one hand when the accident occurred. His Honour summed up, and in the course of his remarks, stated that he was of opinion that it was no part of plaintiff's employment to be on the haulage road. He also thought that the boy was guilty of wilful misconduct. Therefore, there would be a verdict for defendants.

"IN, ON, OR ABOUT A FACTORY."

This was an appeal of a workman from a decision of a county-court judge of Sheffield, deciding that the accident happened under circumstances that rendered the masters not liable under the Act. On behalf of the workman it was contended that in the words "in, on, or about" a factory the word "about" was not used in a local sense, but meant that a workman was to be entitled to the benefit of the Act if the accident happened to him while engaged in or about his duty. Lord Justice Smith, in giving his decision, said that the words meant that the employment must be in the neighbourhood of the factory. The appeal was dismissed.

THE LAW.

Failure of a Brick Manufacturer. — A first meeting of creditors under a receiving order made against J. L. P. Sanderson, described as a brick manufacturer, and formerly tea dealer of Marble Arch Mansions, Oxford Street, and of the Ashtead Brick Works, Ashtead, Surrey, was held on May 7th, It appeared that the debtor formerly carried on business at Fu-chau, China, in the tea trade, but in June, 1894, he was compelled to stop his operations in consequence of want of working capital, having made heavy losses on China tea. At that time there was a heavy drop in that article consequent on a large supply of tea in that year from India, In October, 1896, the debtor purchased the Ashstead estate, consisting of 30 acres of freehold land, for £9,000, raising the purchase money on mortgage. He traded there until February last, when one of the mortgagees obtained judgment against him, and put a man in possession. The statement of affairs showed liabilities £32,504, of which £19,199 were expected to rank for dividend, with assets £2,293. The debtor attributed his insolvency to the action of the mortgagee referred to, which caused him to stop trading; also to loss in the tea business. Mr. R. S. S. Walker attended as solicitor for the debtor. It appeared that an adjudication of bankruptcy had already been made, and the creditors decided to leave the matter in the hands of the Official Receiver as trustee.

The Sale at Tipton Brickworks.—An action was brought at the Birmingham Assizes by Mr. J. H. Trenchard, Commission Agent, of Oldwinsford, Stourbridge, against Mrs. Eliza Jane Wood, of the Platts, Coalbournbrook, Stourbridge, to recover 500 shares in the Stourbridge Blue and Red Brick Company, Limited, or the alternative of £500, for work done and services rendered by plaintiff in arranging for the sale of the Bloomfield Brickworks, Tipton. Mr. Jelf, Q.C., and Mr. Parfitt appeared for the plaintiff, and Mr. H. Young, Q.C., and Mr. Brough for the defendant. The judge briefly put the issues to the jury, who found for the plaintiff. His Lordship then gave judgment for a declaration and made an order upon defendant to transfer to plaintiff 500 ordinary shares, and pay the costs. Stay of execution was allowed on the usual terms.

The Directors of the Buxton Lime Firms Company report that the net profit for the half-year ended December 31 last, after providing Debenture interest, is £12,460, which, with the balance of £4,044 brought forward from last half-year, gives £16,505 available for dividend, &c., and they recommend that a dividend at the rate of 5 per cent. per annum be declared on the share capital of the Company, that £2,000 be added to the reserve fund for equalisation of dividend, &c., and the balance (£4,505) be carried forward. The recommendation as to dividend and reserve are the same as the previous half-year.

TRADE NOTES.

Lead Compounds in Pottery.—The report made to the Home Office by Professor Thorpe, Principal of the Government Laboratory, and Professor Oliver, Physician to the Royal Infirmary, Newcastle-upon-Tyne, on the subject of lead compounds in pottery and the means which might be adopted to counteract their evil effects on the work-people employed in the industry was issued to-day as a Parliamentary Paper. The conclusions arrived at as the result of inquiries at home and abroad are summarised as follows:—(1). That by far the greater amount of earthenware can be glazed without the use of lead in any form. It has been demonstrated without the slightest doubt that the ware so made is in no respect inferior to that coated with lead glaze. There seems no reason, therefore, why in the manufacture of this class of goods the operative should still continue to be exposed to the evils which the use of lead glaze entails. (2). There are, however, certain branches ot the pottery industry in which it would be more difficult to dispense with the use of lead compounds. But there is no reason why in these cases the lead so employed should not be in the form of a fritted double silicate. Such a compound, if properly made, is but slightly attacked by even strong hydrochloric acetic or lactic acid. There can be little doubt that if lead must be used the employment of such a compound silicate—if its use could be ensured—would greatly diminish the evil of lead poisoning. (3). The use of raw lead as an ingredient of glazing material or as an ingredient of colours which have to be subsequently fired should be absolutely prohibited. (4.) As it would be very difficult to insure that an innocuous lead glaze shall be employed, we are of opinion that young persons and women should be excluded from employment as dippers, dippers' assistants, ware cleaners, after dippers, and glost-placers in factories where lead glaze is used, and that the adult male dippers, dippers' assistants, ware cleaners, and glost-placers should be subjected to systematic medical inspection. In the 1893 report the medical members of the Committee expressed the opinion that "many old factories are wholly or in part unfit in a sanitary point of view for occupation," and they suggested "there should be some authority to close them, or whatever part of them is condemned, on the same principle as dwellings are declared uninhabitable." "We share this opinion" (says the report) "and we concur in the suggestion. Certain of the factories we have inspected are in the last stages of dilapidation, and it appears to us to be well nigh impossible to introduce into them such re-arrangements or additions as are required by the amended special rules."

The Paving of Paris.—The annual cost of keeping the pavements and streets of Paris in good order amounts to nearly 24,000,000 francs. Although wood paving is made use of the streets of Paris are still largely paved with stone. The stone-paving covers 6,040,000 square metres. Every year more than 100,000 francs are spent in mending the roads, by resetting the stones. This work is carried out by the Association of Stonecutters at the average rate of 70 francs per 1,000 stones; thus, nearly 1,600,000 stones are reset every year. The stone, asphalt, and macadam paving cost about 9,000,000 francs, and the wood paving costs 3,000,000 francs to keep in repair. To these must be added the pavements and asphalted alleys, the cleansing of the public streets, &c., and thus the total cost amounts to nearly 25,000,000 francs. The average daily number of vehicles in Paris is 50,000, and consists of 1,600 omnibuses and tramcars, 15,000 cabs, 14,000 private carriages, 16,000 business carts, &c. According to the statistics taken by the Municipality, the Avenue de l'Opéra is traversed every 24 hours by 36,200 horses drawing 29,500 vehicles, or 2,262 horses for every metre of its width. To support this wear and tear the roadways ought to be laid with granite from the departments of the Manche or Côtes du Nord in the North of France, or from the Vosges. The use of Belgian porphyry has been given up, as the passing of heavy vehicles renders it too slippery.

Not satisfied with cobble-stones and wood for pavement the city of Lyons has been experimenting with glass as a substitute. Since last November the Rue de la République has been paved with devitrified glass. This new product is obtained from broken glass heated to a temperature of 1,250 deg., and compressed in matrices by hydraulic force. The glass pavement is laid in the form of blocks, eight inches square, each block containing sixteen parts in the form of chequers. These blocks are so closely fitted together that water cannot pass between them, and the whole pavement looks like one gigantic draught-board. It is said to be more durable than stone.

Mr. Arthur Koppel.—Change of Address.—We are requested by the Firm to state that they have removed from Leadenhall Street to Peninsular House. Monument Street, E.C.

Paris Exhibition, 1900.—Protection of Patents.—It has been the custom, on the occasion of every recent international exhibition held in France, to pass a temporary Act, giving protection to patents, designs, and trade marks, in addition to the Act of the 23rd May, 1868, which is quoted in the French Regulations of the Paris Exhibition of 1900. In view, however, of a recent decision of the French Court of Appeal, which has attracted much attention, the French Government are taking special steps to protect exhibitors in 1900. The Royal Commission for the Paris Exhibition have been officially informed by the Consul General of France that a Bill will shortly be laid before the French Chamber, in which certain clauses referring to the invalidation of patents are suppressed. The Act of 1868 will be re-enacted on the present occasion with some amendments. It will give the owner of a design the rights conferred by patent from the date of admission to three months after the close of the Exhibition without prejudice to any patent or registration which he may effect before the expiry of that period. This gives a longer protection than is afforded in similar cases in the United Kingdom by British law, which specifies that application for the registration of the design must be made before or within six months from the date of the opening of the Exhibition. Her Majesty, by an Order in Council dated 2nd February, 1899, has declared that the provisions of Sections 39 and 57 of the Patents, Designs, and Trade Marks Act of 1883 shall apply to the Paris Exhibition of 1900. This relieves exhibitors from the conditions specified in the said Sections of giving notice of their intention to exhibit. The new French Act, it is believed, will give British subjects greater protection than the ordinary British law affords to French subjects; and this, coupled with the fact that French judicial decisions have no effect as binding precedents, should allay any fears which British exhibitors may entertain with regard to exhibiting at the Paris Exhibition of 1900.

Brick-making on the Humber.—The building of brick-works on the Humber bank is proceeding apace. "Klondike," as one of them is known locally, is already so far advanced that a survey has been made for local taxation purposes, and at "Dawson City," which is to be built upon land until recently the property of Mr J. L. Turner, Market Place, Hull, a number of men are at work preparing the ground for building. A commencement has also been made near Beeton's Osiers upon land purchased from Mr J. B. Wood, of Winchester. This yard has been named "Quebec." Negotiations are pending for the purchase of land for still another yard, and evidently the whole of the land at Goxhill bordering the Humber is to be utilised for brick-making purposes. As a result of this development, the scarcity of labour for agricultural purposes has become acute, and one large farmer in the parish has already found it necessary to give a substantial increase in wages.

Brickworks at Newhey.—The Newhey Brick and Terra-Cotta Company, Ltd., formed in April, 1898, to acquire from the Waterhead Land Company, which was then in liquidation, the brickworks at Newhey, has just started operations. There is a splendid bed of shale running under the whole of the Company's freehold land, which is about 28 acres in extent. Since taking possession the Company has removed the whole of the old buildings and machinery, and erected a new plant complete in every detail. Three brick-making machines have been fitted, and are at work. Two of them are each capable of turning out 5,000 bricks per day, and the other 10,000.

Brick Paving in Birmingham.—The Birmingham authorities are now re-paving Wheeler Street with blue bricks, a course which, says the Argus, will no doubt be appreciated by those pedestrians—and they are many—who daily pass along the street.

Proposed Thames Tunnel.—The Bridges Committee of the London County Council have formulated a scheme for the construction of a tunnel beneath the Thames, from Shadwell to Rotherhithe. The total length of the tunnel and its approaches, between Union Road, Rotherhithe, and Commercial Road East, Shadwell, will be 6,825ft., with thoroughfares in the tunnel of 17ft. in width for the carriageway, and 4ft. 2in. for each of two footpaths. The total cost of the project is estimated to be £2,198,250, but of that amount £798,250 is apportioned to the acquisition of property, and the cost of acquiring sites for the rehousing of the industrial classes displaced in carrying out the works.

An American Combine.—An important consolidation is that incorporated by New Jersey under the title of the American Brick Company, with a capital stock of £2,000,000. The new concern is authorised to deal in brick, stone, and building materials of all kinds. The promoters are New York capitalists.

Postal Address: 18, ALBION PLACE. *Telegraphic Address: "MACHINERY," NORTHAMPTON.*

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MIDLAND MACHINERY WORKS,

Depots ST. JAMES' END, NORTHAMPTON.
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INTERNATIONAL BUILDING TRADES EXHIBITION,

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CALL AT **STAND 18**—BAY—GROUND FLOOR.

Specialities :—

BRICKMAKING MACHINES. EXPRESSION ROLLS.
CUTTING-OFF TABLES. PIPE AND TILE MACHINES.
PUG MILLS OF ALL KINDS. DIES, &c., &c.
SELECTION BRICKYARD SUNDRIES AND ACCESSORIES.
BAND SAW BENCHES, CIRCULAR SAW BENCHES, AND ALL PLANT FOR BUILDERS AND CONTRACTORS.

Enquiries for all kinds of SECOND-HAND MACHINERY will receive special attention.

If the article desired is on the Market at all, it will be obtained for you.

☞ WHETHER BUYING OR NOT, A CALL AT MY STAND IS INVITED.

The "MANCHESTER" Continuous Kiln.

(Dean & Hetherington's Patent.)

This Kiln is superior to all others for Burning High-class Facings and Moulded Bricks, Terra-Cotta, Chimney Pots, Tiles, Quarries and other articles.

PRACTICAL MEN state it to be the only Continuous Kiln which has been known to turn out High-class Goods, superior to any Down-draught Kiln (see Testimonial below).

THE UNRIVALLED ADVANTAGES OF THIS KILN

Transcend all others for the thorough drying of all goods whereby the finest colour is ensured. Green Bricks can be set as soon as they are hard enough for piling, and will come out of the kiln (after being treated with the hot-air drying system) of a beautiful tint, without any stain, and ***absolutely free from Loss or Waste.***

The outlet for all steam and moisture from each chamber excels any kiln that has ever been erected on the continuous system. In all other continuous kilns the steam has to travel the whole length of chamber (through all the goods) before it can get away; this is entirely overcome in the "MANCHESTER" KILN.

TESTIMONIAL.

THE REDHILL BANK BRICKWORKS, ROCESTER, STAFFS.,
November 4th, 1898.

DEAR SIRS,—We have now burned round your new continuous kiln for the first time, and are pleased to find the bricks come out a deal better in colour (both corners and facings) than those burnt in the ordinary down-draught ovens. I believe when the kiln gets properly dry the saving in slack alone will be a considerable item, and the bricks, being so much better in colour, will command a better sale.

Yours truly,
A. HEWINS.

Messrs. DEAN & HETHERINGTON, WALL GRANGE, LONGSDON, STAFFS.

Kilns are now being erected for—

MESSRS. HARRISON & Co.,
Anslow, Near Burton-on-Trent.

and

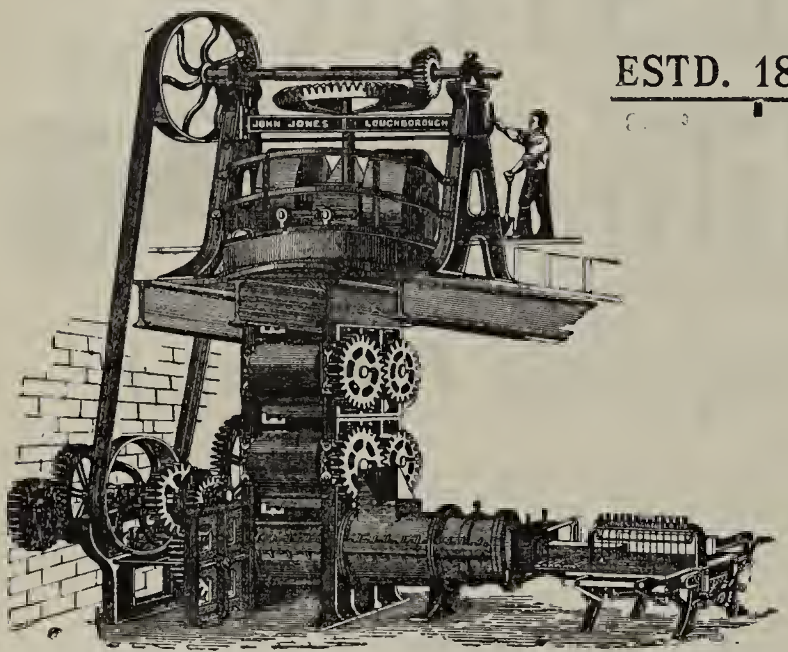
MESSRS. A. R. BULLIVANT & SONS,
Moston Lane, Blackley, Manchester.

Manufacturers contemplating erecting New Kilns should write for full particulars to the undersigned Patentee, who has had 30 years' practical experience in Brickmaking and Burning, and who is in a position to thoroughly explain and work his system.

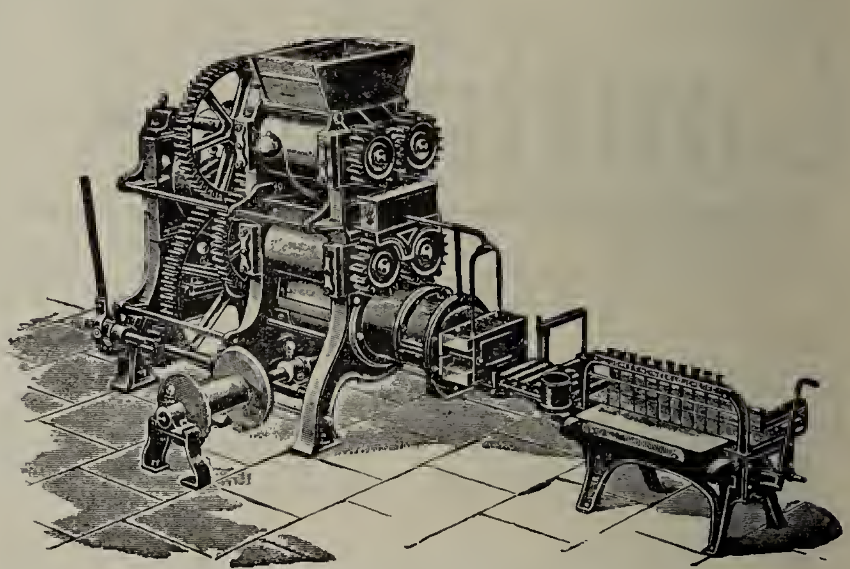
**C. DEAN, WALL GRANGE,
LONGSDON, STAFFS.**

THE "BRITANNIA" BRICK MACHINES

ESTD. 1830.



No. 6 Machine and Clay Pan, 30,000 to 40,000 per day.



No. 2 Machine, 10,000 to 12,000 per day.

ARE BUILT TO ANY CAPACITY.

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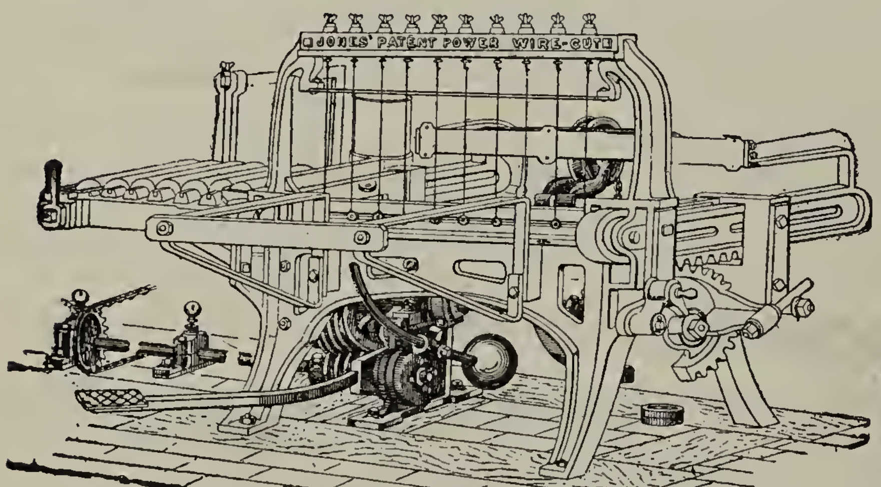
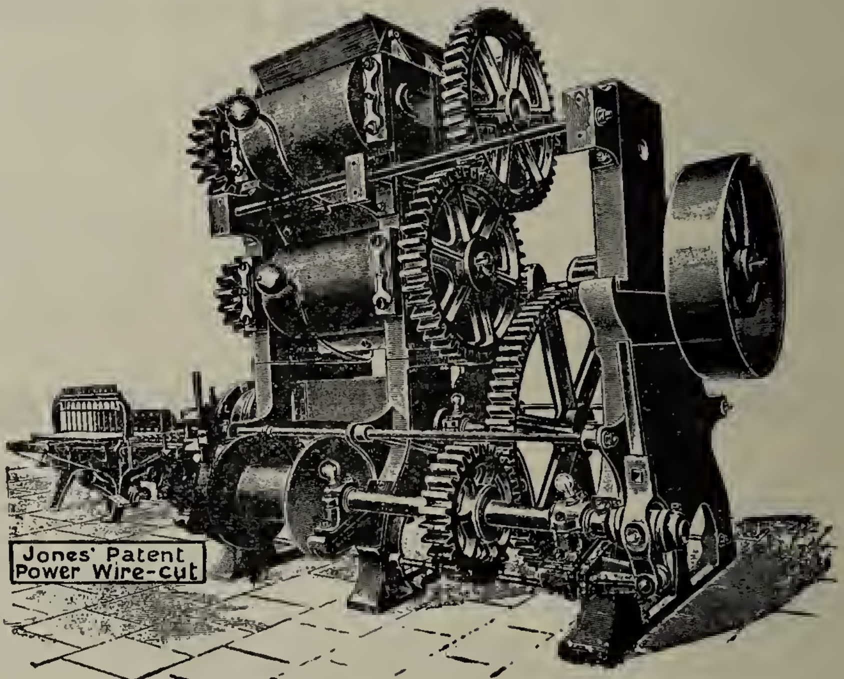


Wire-cut Framing without Wood-work.

Our Patent Power Attachment can be applied to your present Wire-cut, and saves a man at the handle end.



No. 4 Machine, 20,000 to 30,000 per day.

Write for Prices and Particulars to

JOHN JONES & SONS, Ltd.,

BRITANNIA BRICK MACHINE WORKS,

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* ON MIDLAND, L. & N.W., AND GREAT CENTRAL RAILWAYS.

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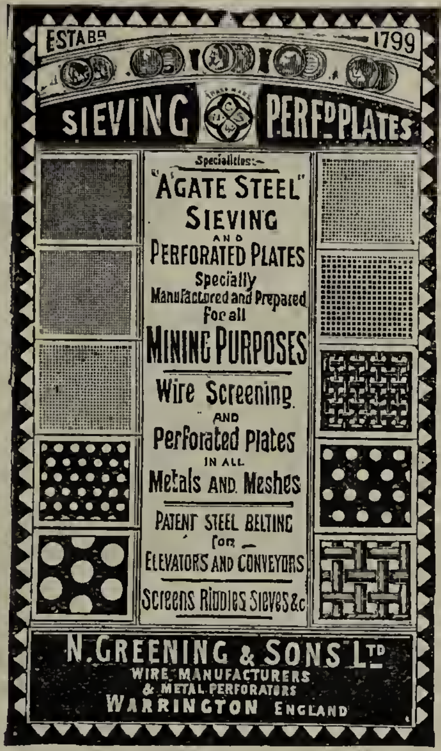

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Machines for—

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272 Prize Medals.

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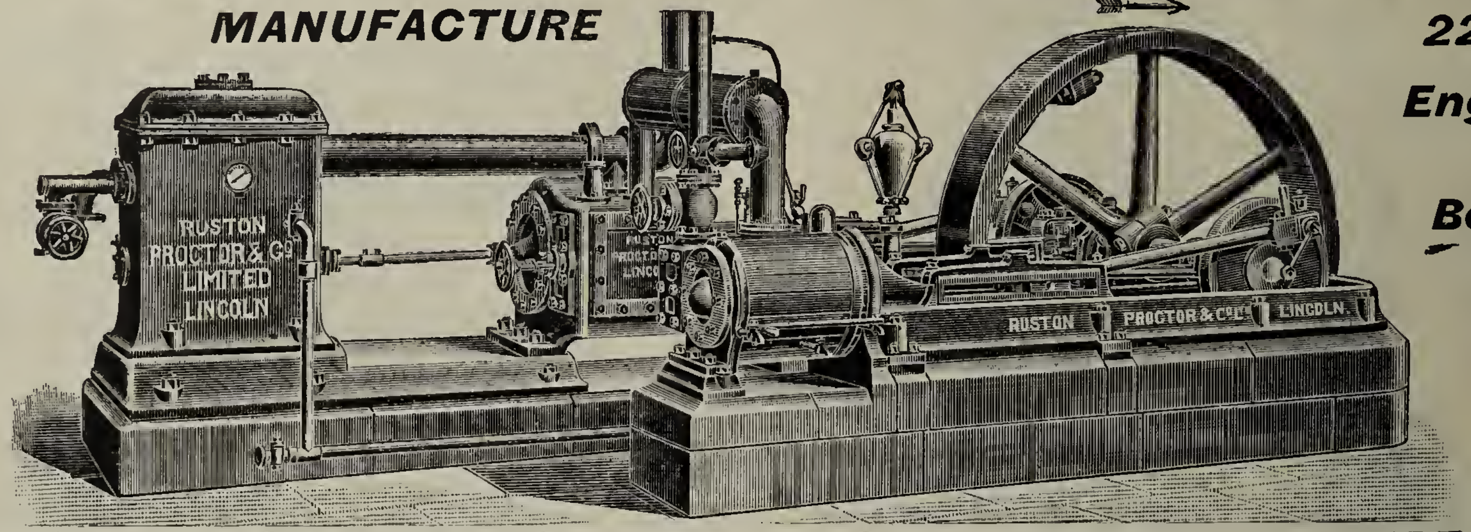
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FIXED ENGINES AND BOILERS OF ALL CLASSES AND TYPES.

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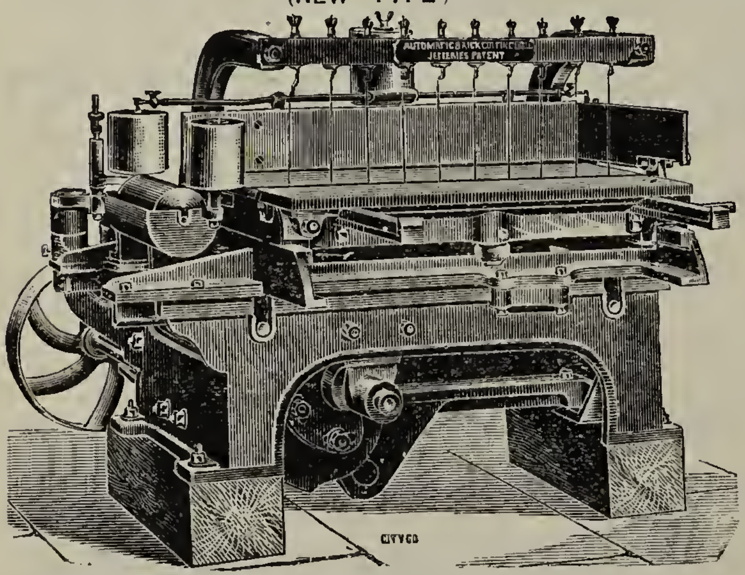
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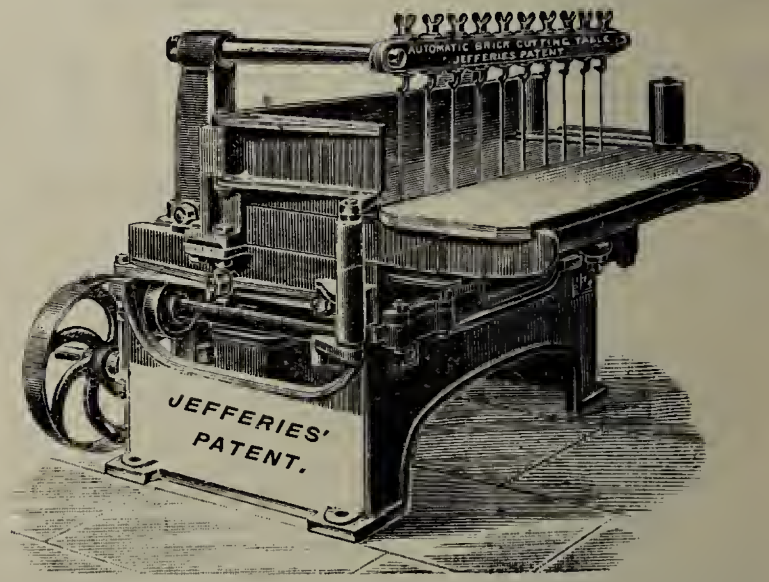
WILL CUT UP TO 4,000 PER HOUR.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JEFFERIES' PATENT.

WILL CUT UP TO 2,500 PER HOUR.

JEFFERIES' PATENTS.

☛ **SAVING ALL LABOUR AND WASTE IN CUTTING.**

As arranged, they will cut ten bricks at once, but this number can be increased or reduced as required. The delivery can be either on the right or left-hand side.

For Prices, Testimonials, &c., apply to the Makers,

SAMUEL JEFFERIES & SONS, BRICK MANUFACTURERS AND ENGINEERS,
STROUD, GLOUCESTERSHIRE.

HUMPHREYS & Co.,

Practical Kiln Builders,

Are prepared to give Estimates and do Building of Kilns, Chimney Stacks, Drying Sheds, or other work according to plan.

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Kiln Builders,
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THE "PIANO" SCREEN.

ADAMS' PATENT.

No Moving Parts.
No Heat Required.
Easily Repairable.
Easily Fixed

CHEAPEST AND BEST SCREEN ON THE MARKET.

SOLE MAKERS:

C. WHITTAKER & CO., LTD.,
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GILL & CO.,

Engineers and Makers of all classes of Brick Machinery,

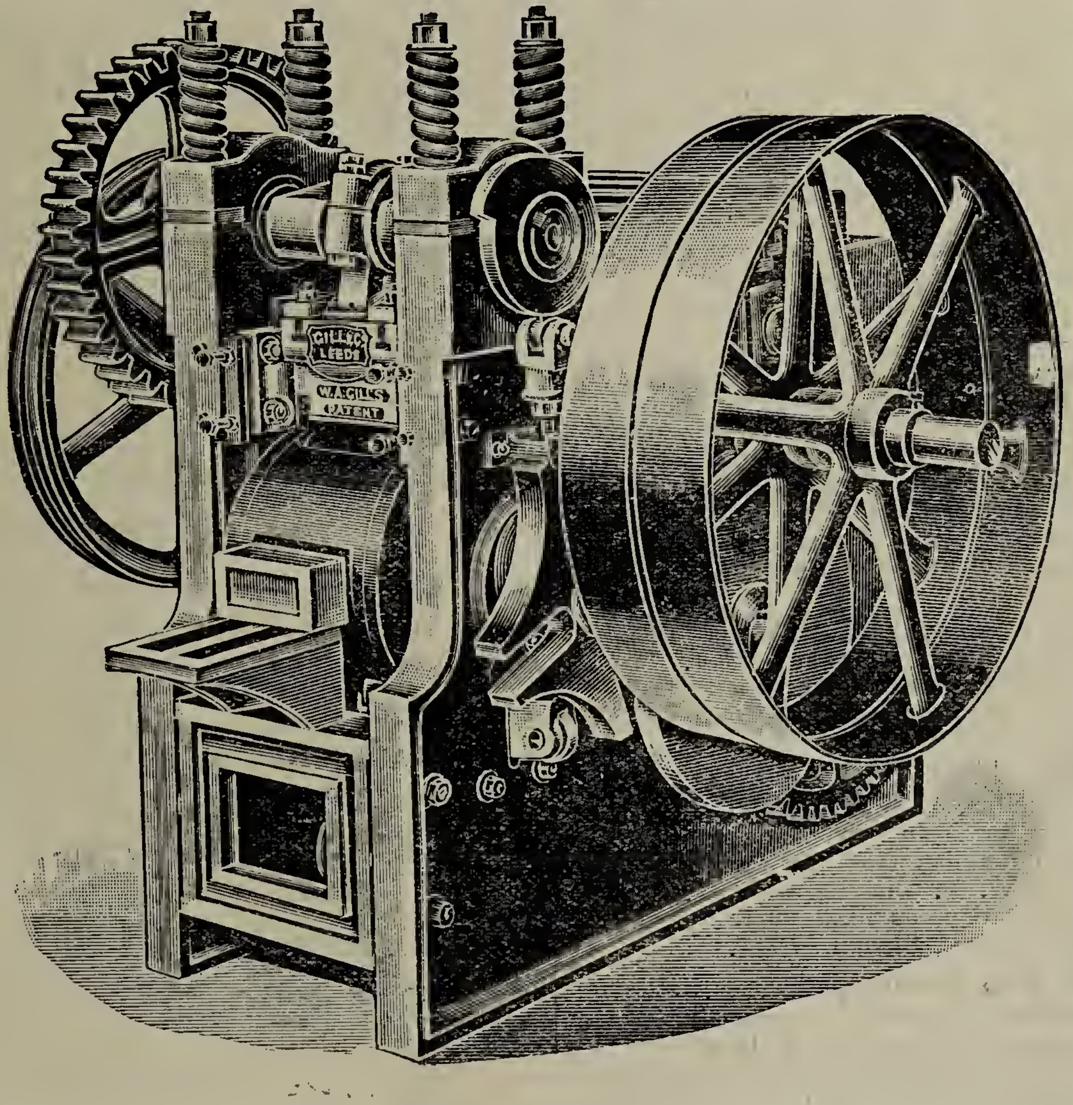
ALSO TITLEY'S BRICK AND TILE PRESS FOR HAND OR BELT POWER.

LEEDS ENGINEERING & BRICK MACHINE WORKS,

HOLBECK LANE, LEEDS.

W. A. GILL'S PATENT PLASTIC BRICK MACHINE

For Red, Fire and Glazed Bricks.



This Machine, as illustrated, makes a stiff plastic finished brick, ready to go direct to kiln if required, at the rate of 10,000 bricks per day of ten hours, from clay ground through a perforated pan or horizontal crushing rollers. There are no screws or rammers used to feed moulds in this machine as in other machines, the clay passes through a pair of fluted expressing rollers and die into moulds in revolving cylinder, thereby making a solid brick equal throughout. ***It has less wear and tear, takes less power, and makes a sounder brick than any other finished brick machine in the market.*** When the feeding rollers are working the cylinder is stationary, and when cylinder is revolving rollers are stationary, thereby causing no friction on cylinder. Bricks made by this machine are free from lamination, which is caused by screws used for feeding the cylinder or moulds in other plastic machines. ***The machine can be fitted with rollers to feed horizontal, as shown, or vertical into sliding mould or revolving cylinders.***

REVOLUTION IN BRICK MACHINERY.

LAMINATION ENTIRELY AVOIDED, HOWEVER STRONG THE CLAY MAY BE.

THIS MACHINE SHOULD BE SEEN BY ALL INTENDING PURCHASERS BEFORE PLACING THEIR ORDERS.

PRICE ON APPLICATION.

NEW COMPANIES.

Callendar Coal Company, 110, High Street, Falkirk.—To take over and carry on the business of the Callendar Coal Company as coal-masters, fire-clay manufacturers, and brickmakers, in Falkirk. Capital, £35,000, in 3,500 shares of £10 each.

Workman, Limited.—Capital £5,000 in £1 shares, for the purpose of carrying on in Ireland and elsewhere, brick, tile, and earthenware manufacture. Directors not less than two nor more than four. No registered office, but company apparently originates in Belfast.

Phœnix Gold Mines, Limited.—Capital £75,000 in 10s. shares. Objects: to acquire mines, mineral properties, &c., in West Australia, as merchants, brickmakers, &c. The first directors—of whom there shall be not less than three nor more than seven—are to be elected by the signatories. Qualification, £200. Remuneration, £150 each; chairman, £200, with a percentage of the profits, divisible.

Hawkwell (Essex) Brick, Tile and Pottery Company, Limited.—Capital, £22,500 in £1 shares (7,500 preference. To acquire the Hill Farm, Ashingdon, Essex, to adopt an agreement with E. W. Ruegg, and to manufacture bricks, tiles, &c.

Felling Shore Brick Company, Limited.—Capital £2,500 in £1 shares. To acquire and carry on the Felling Shore Brickworks at Felling Shore, Co. Durham. Registered office: 55, Pilgrim-street, Newcastle-on-Tyne.

Invincible Brick Syndicate.—To adopt an agreement with H. Kenny and H. A. Rumbelow, and to carry on business as brick and tile manufacturers, to deal in and experiment with vestry refuse, &c., and to acquire and turn to account any patents. Capital, £32,000 in £1 shares.

Queen Red Facing Brick Company, Limited. — Capital £10,000 in £10 shares. To enter into agreements with J. Thornton, J. Heaton, and H. Petrie, and to carry on the business of brick and tile manufacturers, opalite, glass, and aluminium manufacturers, stone, clay, earth, and fire-clay merchants, masons, builders, contractors, &c. The first directors—to number not less than two nor more than five—are to be nominated by the subscribers. Qualification, one share Remuneration as the company may decide.

Newport Pottery Company, Ltd. — Capital £5,000, in £1 shares, to acquire and carry on the business of potters and brick and tile manufacturers, now carried on at the Crindau Pottery, Newport, (Mon.) The number of directors is not to be less than two nor more than five. The first are Samuel Dean, Arthur T. Price, Charles D. Price, Joseph Rogers, and Henry A. T. Skyrme. Remuneration as fixed by the company. Joseph Rogers is the managing director, with £50 per annum and 7½ per cent. on the net profits.

Brown Mill (Bracknell) Brick Company, Ltd. — Capital £10,000, in £1 shares. To adopt an agreement with J. Osman, P. Gay, and J. G. Maxwell, and to carry in the general business of brick, tile and cement manufacturers, and to lay out land for building purposes, &c.

New Lime Company, Ltd. — Capital £25,000, in £10 shares. To lease certain lands near Buxton, Derbyshire, and to carry on business as quarry proprietors, brick and tile manufacturers, &c. The first directors, to number not less than three nor more than six) are: J. Pythian, J. Salt, W. B. Dickenson and T. Swann. Qualification, £250. Remuneration, as fixed by the members. Registered Office, 20, Spring Gardens, Buxton, Derby.

Cliff Vale Brick and Tile Company, Limited. — Capital £6,000 in £1 shares, to acquire and carry on the business of a brick and tile manufacturer carried on by W. Hill as the Cliff Vale Brick and Tile Company at Stoke-on-Trent. Registered without Articles of Association. Registered Office: Cliff Vale Brick and Tile Works, Cliff Vale, Stoke-on Trent.

Crookes Brick Company, Limited.— Capital £20,000 in £1 shares. To carry on at Crookes, in Sheffield, and elsewhere, the business of brick manufacturers, &c. The first directors (to number not less than three nor more than five) are J. Hayhurst, E. Holmes, Jim Mosley, J. Johnson and H. M. Slater. Qualification £500.

John Whitehead & Co., Limited. — Capital £12,000, in £1 shares. To acquire and carry on the business of engineers, iron-founders and manufacturers and patentees of brick, tile and pipe machines now carried on as "John Whitehead & Co." at Preston, Lancs. Table A mainly applies, Registered Office, Albert Works, Preston, Lancs.

Crayford Land and Brick Company, Ltd.—Capital £20,000, in £1 shares. To acquire land, and manufacture bricks, &c.

Invincible Brick Syndicate, Limited.—Capital £32,000, in £1 shares. To adopt on agreement with H. Kenny and H. A. Rumbelow, and to carry on business as brick and tile manufacfurers, &c., and to acquire and turn to account any patents. The directors are H. Kenny, H. A Rumbelow, and H. Mason. Qualification, £100. Remuneration to be fixed by the company.

Sweeney Blue Brick and Terra-Cotta Company, Limited.—Capital £20,000 in £50 shares. To acquire and carry on the Sweeney Brickyard, at Oswestry, Salop. Registered office: Sweeney Brickyard, Oswestry.

Lunesdale District Brick and Tile Co., Ltd.—The accounts of the Lunesdale District Brick and Tile Company, Ltd., show a profit for seven months to the end of December of £2,732. A dividend of 10 per cent. has been declared, £600 added to the reserve fund and £382 carried forward.

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ALL that valuable Freehold WHITE BRICK & DRAIN PIPE WORKS, situate at Bardney, in the County of Lincoln.

The Property comprises about 9 Acres of Land (with one of the finest beds of clay in Lincolnshire), Plant, Machinery, &c., and has been worked successfully for thirty years by the present proprietor and vendor.

There is a convenient siding in connection with the Great Northern and the Louth and Lincoln Railways.

Ample room for extension or for the introduction of any other business.

The new free bridge over the river Witham at Bardney has opened out an extensive area of land under cultivation.

If desired a commodious Freehold Residence adjoining the premises will be included in the Sale.

Part of the purchase-money may remain on the property at a low rate of interest. Splendid opportunity either for a syndicate or otherwise.—Apply to GEO. HALL, proprietor.

£400. SOUTH COAST.—TEN ACRES finest possible RED CLAY. Building Estate now opening. Owner take purchase-money in Bricks.—"Cranmore," 43, Essex Street, W.C.

FOR SALE, a Genuine OLD-ESTABLISHED BUSINESS. Bricks, Tiles, Pipes, &c. Owner retiring. Good opportunity for young man with moderate capital. Address "Yard," Office of this Paper.

BRICKMAKING LAND at South Bank, near Middlesboro', for brickmaking. Forty acres of best quality CLAY, 30 ft. seam, To be Let on Royalty.—Further particulars from N. R. Fleming, Estate Office, Normanby, near Middlesboro'.

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WANTED, good Second-hand BAT ROLLER TILE MACHINE, Ward's principle.—Apply "Oak," c/o this Journal.

FOR SALE or HIRE. Several large PORTABLE ENGINES, 6 to 20 horse; Wash Mill, Pug Mills, Chain Windlass, Crushing Mill, Brick Machine, Chain Pump—Centrifugal, Deep Well Pumps.—Address, Willsher, Forest Hill, S.E.

MACHINERY, &c.—*Continued.*

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£200. COMPLETE "WHITTAKER" SINGLE PRESS MACHINE, and a 9-ft. Perforated Pan. Little used. A bargain. Oliver's Brickworks, Northampton.

FOR SALE, a very powerful PUG MILL (Whitehead's Cutting-off Table. Capacity 10,000 per day. Equal to new. Also Hayward Tyler 9-in. bore Pump in splendid condition, equal to new. No further use.—Apply, E. R., Drake House Brickworks, Beighton.

FOR SALE, One high-class 30 by 7 Double Rivetted STEEL LANCASHIRE BOILER, with all Modern Mountings.

One 24 by 36in. Horizontal Expansion Steam Engine, heavy fly wheel, &c.

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One 11 and 20in. by 24in. Compound Condensing Tandum Engine.

One 12½ ,, 22in. ,, 26in. ,, ,, ,, ,,

Two 20 by 6 Lancashire Steam Boilers, all mountings, &c.

One 24 ,, 7 ,, ,, ,, ,,

One 18 ,, 6 Galloway ,, ,, ,,

For full Particulars & Prices address—J. LIGHT, Wolverhampton.

FOR SALE, one 3½ in. Ram Boiler Feed PUMP, 6 in. Cylinder, 6 in. Stroke, by Wm. Turner, Salford, £14.—J. Light, Wolverhampton.

FOR SALE, a superior massive 30 in. by 48 in. HORIZONTAL EXPANSIVE STEAM ENGINE, with heavy Fly Wheel and appliances; a grand engine for large brickworks.—J. Light, Wolverhampton.

FOR SALE, MURRAY'S 01 PATENT BRICKMAKING MACHINE; 10,000 per day, with cut-off table. Price, £60, nearly new.—Apply No. 206, c/o this paper.

FOR SALE, Bowden Patent JUGGING and BRICK MACHINE, little used. Horse or Steam Power. Also Hand Brick and Pipe Machine with six dies. Sacrifice £25 the two.—Hooper, Westbury, Wilts.

KILN CENTRES.—The Atlas Brick and Tile Co. Ltd., of Willesden Junction, London, having completed their new Continuous Kiln, are desirous of disposing of the Centres, which are equal to new, and those contemplating extensions should not miss securing these. Price and particulars on application.

FOR SALE, a Bennet & Sayer's Plastic Brickmaking Machine, consisting of two pairs Heavy Crushing Rollers, adjustable, one heavy Pug Mill, with Brick and Pipe Dies, Shafting, Driving Pulley, with patent friction connecting gear, being removed to make room for larger machinery.—For particulars, apply to the Secretary, The New Malden Potteries and Brickworks, Limited, New Malden, Surrey.

FOR SALE, a SCHOLEFIELD'S ECLIPSE. All Brickmaking and Pressing Machine combined, stiff plaster, in new condition.—Apply, "Eclipse," c/o *British Clayworker*, 43, Essex Street, Strand, London, W.C.

PUG MILLS, Two Modern, for horse power, as good as new, £27, or £14 for one. J. Grover and Son, Wilton Works, New North Road, London.

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Anti-Scum Paste, No. 1	30s. per 40 gals.
Do. No. 2	35s. ,,
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Heavy Engine Oil	1s. per gal.
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Apply to the Tyne Oleine Co., Guildhall Chambers, Newcastle-on-Tyne.

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Powerful pair H.P. Horizontal Engines, 36in. by 5ft. ; cut-off ; modern ; by Hicks.

Massive Compound Engine, 21in. and 30in. cylinders. 3ft. 6in. stroke, 300 I.H.P.

Capital 36in. by 36in. very modern Horizontal Engine, by Black, Hawthorn.

Corliss Engine, by Hick Hargreaves, 24in. by 4ft., Corliss Valves, etc. ; equal to new .

12in, and 21in. Compound, modern.

Also capital selection of Horizontal Engines, 24, 22, 21, 20, 18, 16, 15, 14, 12 and 10in. cylinders.

Portables, 25, 20, 16, 12, 10, 8, 7 and 6 H.P.

Boilers, 30ft. by 8ft., for 80lbs., and all fittings.

Do., 30ft. by 7ft. 6in., for 80lbs.

Three do., 30ft. by 7ft. for 60lbs.

Also many others, and a large stock of Cornish Boilers.

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Locomotives, Traction Engines, Cranes, and an Immense Stock of Machine Tools.

The above are in stock at Bolton.

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Catalogue on application.

Best Stock of Machinery anywhere.

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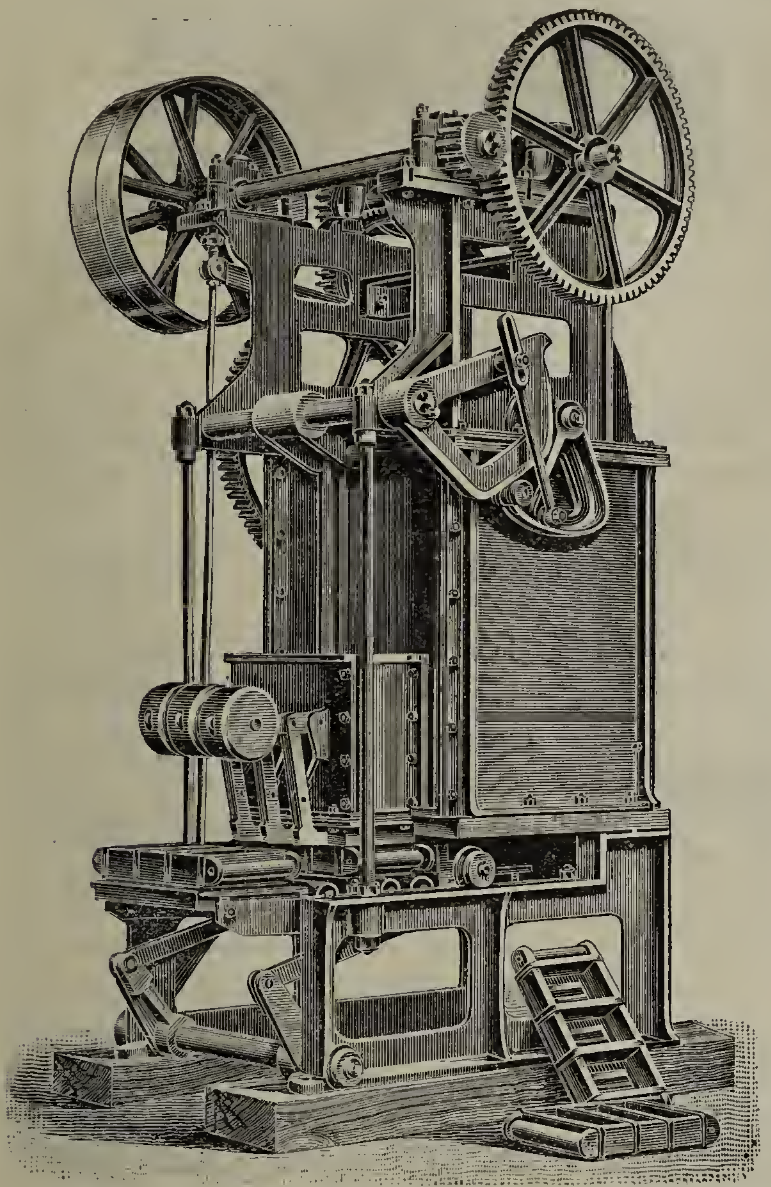

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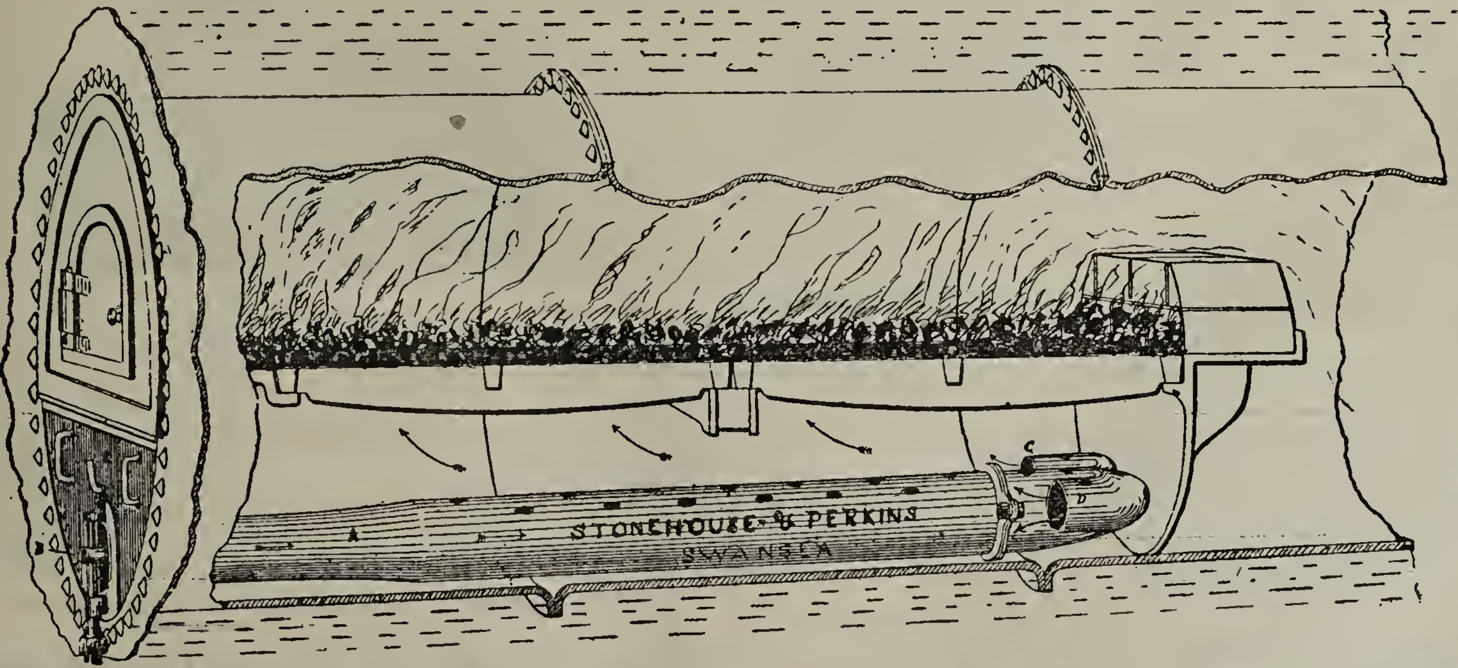

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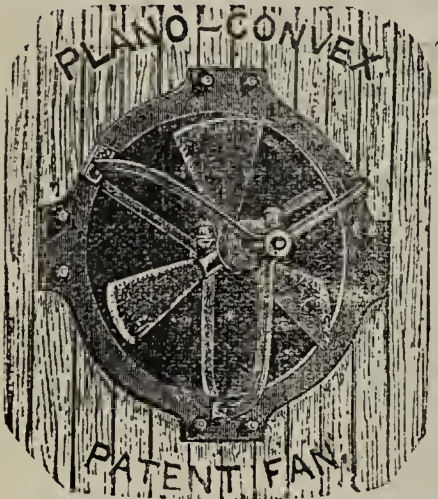

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THE BRITISH CLAYWORKER.

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"THE BRICKBUILDER" (SUPPLEMENT) :—

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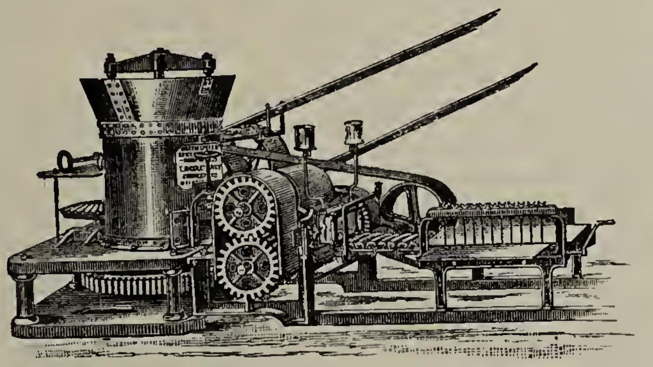

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Will work where most other Dies fail.

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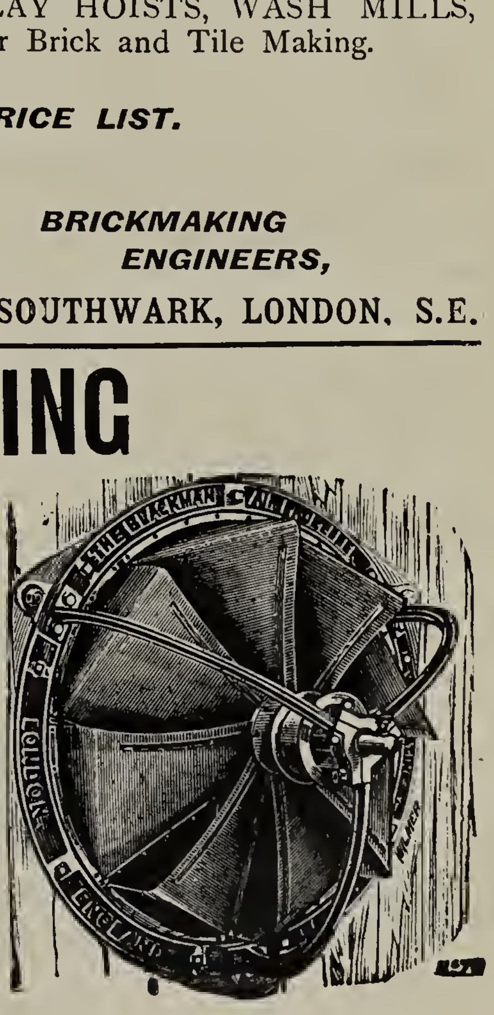

N.B.—We are not responsible for results when our Plant is used without our advice.

BY THE WAY.

The Berlin Explorers start on Thursday next, after dining together at the Holborn Restaurant at 6.45. We wish them a jolly time and a safe return. There will be over 60 in the party.

* * *

By the way, no less than six of the "Great unpaid" have booked seats for the trip, so that we may expect a full bench of Magistrates should any of us be called up for judgment.

* * *

The present month has been marked by enthusiastic meetings of the Institute of Clayworkers, held during the progress of the Building Trades Exhibition. They show that the Institute is alive and vigorous, and the election of a President annually is likely to give it a further fillip. We confidently anticipate a large accession of members during the present year.

* * *

The report of the general meeting of the British Clayworkers' Mutual Insurance Corporation, Ltd., was more like a romance than the sober statement of facts concerning a business enterprise. Those brickmakers who took our tip to buy B.C.W.M.I. Co. shares, will hardly, we think, be likely to regret their purchase.

* * *

We hope that brickmakers, now that they see the Corporation means business, will rally to it throughout the country, and give it all the help they can. The Corporation was started to help them in a practical way ; it does not want their money, but offers them better terms than they can get elsewhere. Can anyone want more?

* * *

"Congratulations to Mr. J. R. Featherby, J.P., upon his election to the important position of Chairman of the Gillingham District Council. The members are thus adhering to the principle they practically adopted three or four years ago, of making the Chairmanship a reward for good service to the Council and the ratepayers, and so distributing the honour and responsibility. The appointment will undoubtedly be a popular one. A conservative in politics, Mr Featherby is a Nonconformist and broad-minded in theological matters. He is sympathetic towards sport and field games, and countenances conviviality within reasonable limits. He is a capital vocalist and a man of musical culture, but does not taboo social smoking concerts, at which he occasionally presides when some good cause is to be served. He has had considerable experience of public work, and has an intimate knowledge of the requirements of the district. These points, coupled with his excellent business qualities, even temper and general bonhomie, will tend to make him a successful Chairman." So says a Kent journal—May we add our congratulations. Mr. Featherby will be a welcome addition to our party for Berlin this year.

* * *

A shocking picture is drawn by the Vienna correspondent of the Daily News of the deplorable condition of the men of the great brickworks on the southern precincts of Vienna, who are about to organise a big strike. They ask that the promises made by their employers years ago, when the Neue Freie Presse and the Radicals in the Reichstag called attention to their condition, be kept. There are ten thousand of these brickmakers. All live in miserable huts provided by the employers. Five and six families have been found in one moderately-sized room, where the cooking for all is done, and where a chalked line marks the portion allotted to each family. As soon as a strike breaks out the wretched people are turned out of their lodgings, for which, be it said, they pay exorbitant rents.

* * *

We always thought that the brickmakers of Belgium were as badly off as any on the Continent, but Vienna seems to take the palm in this respect. British brickhands have much to be thankful for if they only knew it.

* * *

A knowledge of elementary stratigraphical geology is very useful to the brickmaker, as well as to his clients, as the following will show. Interviewing a chief representative of a well-known brickmaking firm, the other day, the writer had occasion to enquire as to the nature of the clay used at the works. From the geographical position of the place, we suspected that the clays employed formed part of the "Reading plastic clay" series. The locality was considerably over 100 miles from Reading. The answer was, "Oh! dear, no! Our clay is plastic and mottled, and answers your description, but it would never do for you to call it Reading clay." Then came the inevitable, "Our clay is far better than the Reading clay."

* * *

The writer ventured to observe that the Reading plastic clay was an integral part of what is known to geologists as the Reading series, and that the term was only used in that sense. It was further explained that the same geological formation had an enormous length of outcrop over a large part of the fringe of the London and Hampshire basins. Another man, a principal, objected to the writer's calling his clays of "Inferior Oolite age," because, he said, people would think his clays were of an inferior description. Whereas, the term in its scientific acceptation, merely refers to the relative position of the beds with reference to other divisions in the Oolitic series—it being inferior in position to them, *i.e.* lying underneath them. A third man took exception to his clays being called "Silurian," as that term had now become so well-known as a particular tint of colour ; yet we only alluded to the geological age of the clay, which is unquestionably Silurian. In ordinary conversation, we frequently employ words having more than one meaning, and it is not too much to ask that the same latitude be permitted in assimilating science with technical instruction.

* * *

The Building Exhibition of 1899 is over, and we shall not see another for two years. From all points of view a thoroughly representative show, it was especially illustrative of the best that this country can produce in the art of clayworking. From the brick of commerce to the most delicate of tile or the ponderous sanitary appliance, the products were first-class, and give a fair indication of the high standard to which clayworking in all its departments has advanced. We congratulate the trade upon its effort.

* * *

It is satisfactory to find that the Exhibition was attended by more Architects and Engineers than it has ever been before.

THE BRICK-EARTHS OF GREAT BRITAIN.—XXII.

ELY AND DISTRICT.

The flat alluvial soil extends southwards and westwards from the neighbourhood of Downham Market, and is everywhere of much the same character. It may be used for brickmaking, but generally speaking cannot compete for homogeneousness with the thick and fairly pure clays of the Kimeridge series so well developed near Denver and to the south of Hilgay and Southerey.

Walking across the Methwold and Feltwell Fens, following the course southwards of the river Ouse, we arrive on the outskirts of Whelp Moor where, near the village of Littleport, is an extensive outlier of Kimeridge clay. This ushers in the outcrops of the solid rocks of Ely and district. In descending order we discover the following formations to exist here (see sketch map, fig. 1):—

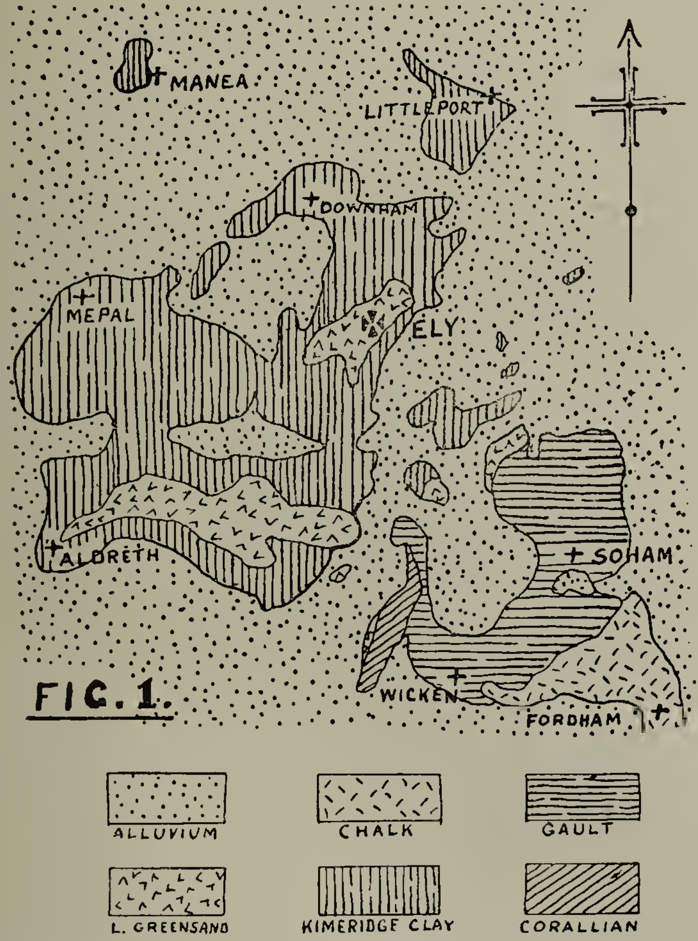

FIG. 1.—SKETCH MAP OF BRICK-EARTHS AT ELY, AND NEIGHBOURHOOD.

1. *Chalk.*—The lower portion only, largely consisting of highly calcareous marl, with green grains interspersed throughout. It is developed at Fordham, some miles to the south-east of Ely. Seeing that the Gault clay is so near, we are tempted to observe that a much greater variety of bricks and clay goods of other kinds could be made here than are at the present time. This marl is eminently qualified for making slip, and what clay there is with the calcium carbonate is very pure. Moreover, the formation is comparatively free from iron. The exact nature of the green grains is not known, they are highly decomposed, and are generally assumed to be glauconite, which is a hydrous silicate of iron and potassium. It does not occur in a crystalline form, and closely resembles earthy chlorite; chemically considered the chlorites are silicates of aluminium with ferrous iron and magnesium and chemically combined water. We mention these facts to show that it would be difficult to get a sound basic brick from this marl, and that, if used at all, it is best suited for slip for mixing with the fat clays so abundantly found in the district, as will be immediately referred to. It is impossible to expect a very white brick from the compound, however, and the general tint of the produce of the kiln would, no doubt, be pinkish when well burnt. At present this marl is not used, so far as we are aware, in this part of the country. We suggest its use in the production of light tinted goods.

2. *Gault.*—In the neighbourhood of Ely the uppermost part of this formation consists of a thin sandy marl, with occasional phosphatic nodules. This appears to be the northward attenuation of the so-called Cambridge Greensand, which at Hunstanton—fifty miles further north—is represented by a bed of red chalk. The bulk of the formation, however, is a thick black clay, with few phosphatic concretions and an occasional bed of septarian nodules. For the purposes of brickmaking the larger septaria are dug out and thus separated; the phosphatic material when large is taken out in the same manner, but is frequently small enough to be allowed to remain for the mill to deal with. An immense patch of this clay occurs in the vicinity of Soham, Wicken and near Barraway (see fig. 1).

3.—*Lower Greensand.*—This formation is not of much importance to the brickmaker in the Ely district. It occurs at Aldreth, Wilburton, Stretham, to the south-west of Stuntney and the town of Ely is situated upon it. In general character it is similar to that described in the last article, at Downham Market and northwards.

4. *Kimeridge Clay.*—This clay, of immense thickness, is the best developed earth suitable for brickmaking near Ely. A glance at the sketch map (fig. 1) shows its extension over many square miles, and, in reality, it is found near the surface under a great portion of the area denoted "alluvium." It is a fat, marine clay, black when wet, grey when dry, brown when weathered at the surface; it contains many large tabular septaria (dealt with as before mentioned), and in general is the same as the Gault clay already described, except that it contains different species of fossils, and is, consequently, of different geological age. The formation is very persistent, but yields a narrower outcrop in passing southwards, to the west of Cambridge. It is a good brick clay, but might be better for a little more

sand. The output is always of a solid character, but the clay has to be very carefully dried and burnt to prevent the development of cracks. It is one of those peculiar earths from which interstitial moisture is a long time in passing, and too rapid expulsion leads to sweating and its attendant inconveniences. Long experience with the clay has taught the value of most careful burning.

5.—*Corallian Beds.*—These are of little interest to us, being mainly composed of ragged and rough limestones, sometimes of a rather sandy nature. They outcrop, in the district under consideration, about a mile to the west of Wicken (see fig. 1).

Turning now to the section, fig. 2, we perceive that in all cases the alluvium (*a*) is very thin and rests indiscriminately on the solid deposits—now on the Gault, now on the Kimeridge clay, and out of the line of our section, on the chalk, corallian and what not. In addition to this alluvium there are the usual gravels and loams of the river valleys, forming other Pleistocene deposits; but we have not thought it worth while to allude to these in detail as there is such a superabundance of thicker and more homogeneous material in the Gault and Kimeridge clays.

FIG. 2.

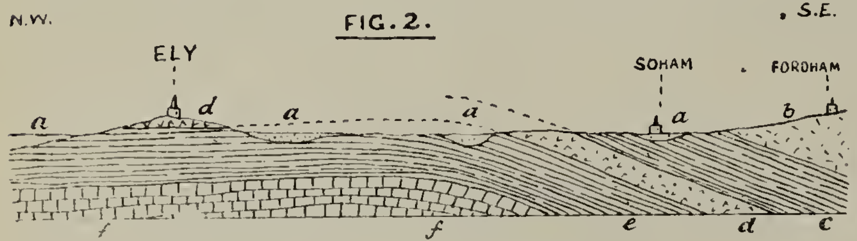

Fig. 2.—Section from near Ely, to Soham and Fordham (see fig. 1).
a, Alluvium; *b*, Chalk; *c*, Gault; *d*, Lower Greensand; *e*, Kimeridge Clay; *f*, Corallian beds.

The section (fig. 2) gives an idea of the lie of the beds, showing a dip to the south-east, but on the whole, the north-western half of the section is fairly horizontal. The reader will understand, however, that by reason of the impossibility of reproducing the section to scale (the pages of the *British Clayworker* would have to be many times wider to enable that to be adequately done), the dip is not as high as it is shown, whilst the vertical height is, of course, exaggerated. Similarly, there is no attempt made, except in a rough and ready manner, to draw the thicknesses of the beds to scale.

Altogether, the neighbourhood of Ely is interesting to the clayworker from many points of view. Not far away, as at Somersham, Colne, Bluntisham, and for many a square mile to the westward, the Oxford clay crops out, and raises visions of Peterborough and Fletton. St. Ives, too, is near by, where the same formation crops out and yields to several enterprising firms one of the best earths for brickmaking to be found in the country. But we shall have something to say about that presently.

Cambridge and District.

Considering the enormous quantity of earth suitable for brickmaking in this district it is rather surprising that it is not more largely drawn upon. Of course, we know, well enough, that several large, important yards exist near the town, and for years not only bricks, but drain pipes and tiles have been extensively turned out. The clay dug is almost exclusively from the Gault, which is here a black, unctuous, fat clay, but slightly (microscopically) sandy along certain horizons. The usual phosphatic nodules are fairly abundant, but the clay wants but little attention, and is eminently suitable for the uses to which it is put. Officers of the Geological Survey, writing in 1881, state, with reference to the bricks, that they are "hard and durable, being much better in quality than in appearance." This statement seems to have gone round; but we may remark, that whatever the materials looked like in 1881, they are quite as good as any bricks made from Gault clay at the present day.

Our sketch map (fig. 3) gives an idea of the development of the "solid beds" round Cambridge. Of course, this map, like the others, is based on the "solid edition" of the Government Geological map.

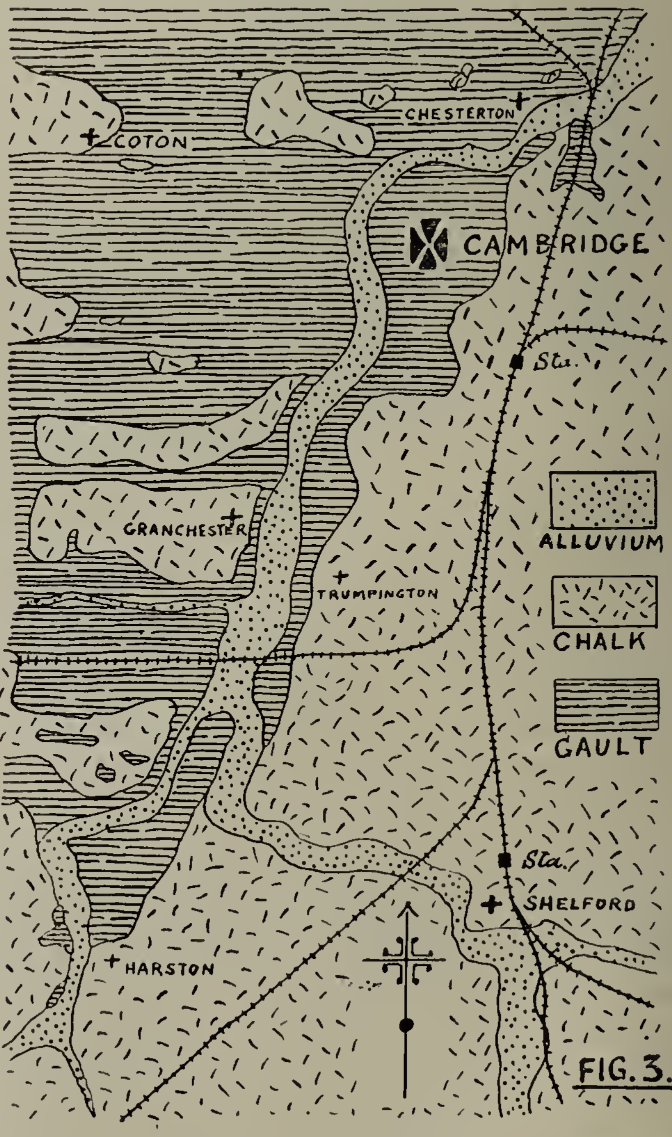

FIG. 3.

Fig. 3.—Sketch Map of Brick-earths, &c., in the Cambridge district.

BRICK "RATTLING" TESTS.

ARE THEY OF ANY VALUE?

THE serious attempts recently made to induce large brick buyers to have the bricks first tested in a "Rattler," so as to gauge their quality and suitability for certain purposes, demands a few observations from us on the subject. The brickmaker is already asked for the chemical composition of the brick, its specific gravity, its rate of absorption of water, its co-efficient of expansion in varying temperatures, its resistance to compressive force, its micro-structure, its behaviour in water when red hot, its fire resisting qualities, its "bursting" capacity in Glauber's salt and freezing mixtures, its rate of disintegration when subjected for a long period to the action of dilute sulphuric and other acids, its relative hardness, its tensile strength, &c. Not that any brickmaker ever dreams of having all of these wondrous processes applied to his bricks, however liable he may be to furnish information on some of the heads occasionally.

But now we are threatened with the aforesaid "Rattler." Hitherto we have been able to regard rattling tests from afar, and have been but passingly interested in results obtained in the United States and on the Continent. A year or two ago the subject was brought a little nearer home, when we found that certain energetic surveyors had already been rattling stones, and just a few bricks only, in London, in Cornwall, and a few other districts. We lived in the hope that whilst unfortunate stones might be rattled beyond recognition, the highly respected brick might be left alone. The rattling test seems to have been largely adopted, however, especially so far as paving bricks are concerned. The chief point is—Is this test of any practical value?

Rattling machines are of various sizes, shapes, and sorts There is the horizontal iron or steel cylinder with flanged ledges fixed more or less horizontally inside. Into this instrument of torture the bricks are placed after they have been most carefully weighed. The cylinder cover is fixed, and the machine slowly revolved—say from 20-35 revolutions per minute. The bricks are caught up on the ledges and bang against each other and the sides of the cylinder, until practically all the life is knocked out of them, so to speak. The unfortunate objects cannot withstand this sort of thing very long, and the inquisitor suspends operations at about the thousandth revolution. The torture chamber is again opened, the inoffending bricks dragged forth, dusted (the irony of it!), and re-weighed. The brick that has lost most in weight is regarded as the worst in quality.

If we were to get inside the cylinder with the bricks we should witness a continuous bombardment during the revolving process. A few bricks being taken up by one or other of the ledges fall from near the top of the cylinder (inside) to the bottom. Any bricks in the latter position are liable to be fractured, especially near the corners and sharp edges. It will be readily seen that fractures may arise accidentally by this process, and a really good brick well aimed at by some of its companions may suffer more than it otherwise would. The chances involve too great a risk to get results of any scientific value.

Again, the surveyor has no right to call such experiments as this "abrasion tests." There is precious little abrasion, and a great deal more bombardment, and bricks are not bombarded in practice, unless indeed they be built into a sea wall, or in a similar situation.

Moreover, such tests can never be of comparative value unless in all such experiments the cylinders be of exactly the same size, the projecting ledges of the same width and thickness, bevelled in the same manner and placed in precisely the same positions within the cylinders. In other words, the cylinders must all be of the same kind, size, and make. This observation will be patent to the reader without comment. A standard size would have to be established, and when anything of that kind has ever been attempted in this country it has always been doomed to failure. Every experimentalist will have fads of his own, and will take no more notice of standards than if they had never been created.

An insuperable difficulty is in getting all the bricks of the same size. It is obviously unfair to put a small brick in the cylinder with much larger ones. The presence or absence of frogs, the shape and size of these latter when present, and matters of that kind must be attended to if the results are to be comparative. And if they are not comparative, they are of no practieal use.

A modification of what we may call the bombarding machine is that form in which the ledges are absent, and the bricks (not too numerous) are placed in the cylinder, after being weighed as before, to have a sort of "rough and tumble" amongst themselves. This is fairer, perhaps, but cannot strictly speaking be called an "abrasion" test. There still remains the jarring and fracturing consequent upon the bricks falling upon each other—an operation which finds no analogue in practice. At most it can only be regarded as a sort of game which students of surveying may play at.

A more scientific form of "rattler" is that in which the sides of the cylinder are lined with the bricks to be tested, though we do not know that the results are of any greater value. The bricks having been fixed in position, some loose scrap iron is introduced, the cylinder cover is put on, the machine is revolved as before, the scrap iron runs amuck dealing blows to all and sundry, and rubbing over the surface of such bricks as may be in its way. This method has at least one advantage over the others mentioned, in that the bricks cannot hurt each other, and there is certainly more pretence of abrasion. But, for such tests to have comparative value not only must the machines be alike in every respect, but the "scrap iron" must be selected so that it may be of uniform hardness. Further, the scrap iron ought to be composed of pieces of iron of the same shape and size, and if at all angulate should be renewed at every test, as corners are apt to become rounded off. In other words, abrasion carried out with odd pieces of angular scrap iron is a hopeless affair. Fresh scrap iron would *per se* do more abrading work than old and rounded off scrap iron. The practical brickmaker will appreciate this point at once.

Now we come to a method of abrasion which is supposed to give far more accurate results than any of the others. In one form or another it has found favour in Germany and France, as well as in certain laboratories in the United States. The materials mostly tested by it are paving stones, not bricks; still in Ohio, amongst other localities, it has been used on bricks. In this, the bricks after being weighed, are placed face downwards on a rotary table of zinc, lead, iron, or steel. The table is usually actuated from the centre, from which spring stationary bars as radii. It will be perceived that the bricks placed upon the revolving table cannot go round with this latter, as they are brought to a standstill against one or another of the bars acting as stationary radii, the latter being fixed only an inch or so above the level of the table. Sand is sprinkled over the table and water drips on it at intervals. The sand and water act as a grinder which finds its way under the downturned face of the brick and begins to grind it away.

At first sight this seems a fair process, but it is, in our opinion, worse than the others, if anything. Anybody who reflects for a moment on the rate of movement of the surface of a revolving table, will be aware that the outside moves very much more rapidly than the centre. Consequently the precise position of every brick tested on the table should be equidistant from the centre. For, if otherwise, any particular brick would get either more or less grinding than its neighbour, depending on whether it was farther away or nearer to the centre of the table. On the other hand, if all be equidistant, there would be the strong probability that some of the bricks would get only used up sand, instead of fresh, crisp, sharp sand, which would, of course, do more work.

Although that danger alone would be sufficient to impair results, there are many others lurking in the immediate vicinity. For instance, the dry brick is weighed beforehand (though we know of one establishment where the weight of the saturated brick is taken), and the instant it is placed on the wet table it commences to absorb water. As the reader knows, there is a great difference in the relative porosity of bricks, and there can be no doubt whatever that the water of absorption is often confounded with the loss in weight of the brick by grinding, or attrition. Again, to give results of any value whatever, the weight of all bricks tested should be the same. For, if not, the heavier brick will promote greater attrition between its downward surface and the surface of the revolving table (the sand being between them) than a lighter brick could possibly do. This difficulty could be got over by weighing each brick so that it should come up to a standard weight. Then there is the impossibility, as matters stand at present, of getting the ground face of each brick to be of the same superficial areas If it is not of the same area, then, as Mrs. Malaprop has said, any "comparison would be odorous." Sharp sand is to be used in the grinding. Will anyone oblige by giving us a definition of sharp sand from the cutting and grinding points of view?

We happen to know something about the cutting propensitiet of sharp sand, and our judgment about it is very similar to that of her Majesty's judges the other day when they had to define what a "place" was. There is sharp sand that will cut through a slab of stone in the "twinkling of an eye," and there is sharp sand that won't do anything of the kind. If anyone thinks he is going to set up a sort of standard of abrasion with bricks on the round-table-sharp-sand principle he must be a deluded man.

We ought not to forget, in an article of this kind, of a suggestion recently emanating from a "high authority," whose chief qualification, so far as brick tests are concerned, appears to be wrapped up in his ignorance of the subject. "Sand is of too variable a quality to be depended upon," says this *savant*, "try corundum." Our readers are, no doubt, aware that "corundum" is merely another name for "emery." Emery is also a variable substance, but its chief detriment for the purpose in hand is that being so much harder than any of the constituents of a brick its operation is altogether too drastic. Again, grains of the emery get fixed in the softer bricks, so that the latter actually become the abradors (of the table) instead of the abradees.

There is no knowing of the end of the wiles of the astute tester; he is much too artful. The unsuspecting county surveyor; the all-important autocratic borough surveyor; the easy-going, self-satisfied civil engineer; the architect with more work than is good for his art; the students of all these avocations with their embryonic ideas, and a desire to "get on," to which end they must write papers for the societies, to call themselves into existence—all these innocent persons the "artful tester" regards as his legitimate prey.

We can do no more than call attention to the facts, in the hope that the brickmaker will not be burdened with having to provide "rattling" and "abrasion" tests for his customers. For, surely, these are the most useless and unproductive "tests" that have ever been attempted to be foisted upon the clayworker.

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BOOK-KEEPING FOR BRICKMAKERS.—IV.

BOOKS REQUIRED.

Monthly Accounts Book.—This book used in conjunction with the Cash Book, Sales Day Book, and Sales Ledger, will be found very useful, as by its adoption the position of each customer's ledger account is seen at a glance, and a sharp lookout may be kept on overdue accounts. At the same time the book-debts each month are shown in total, and this, coupled with a knowledge of his customers' habits of payment will enable the manufacturer to regulate his own finances. By reference to the example it will be seen that the working of the book is simple. At the end of each month, the month's accounts as shown by the Sales Day Book are entered, the customers' names being placed in alphabetical order. The arrears from the previous month must then be brought forward into the allotted column, and added to the month's account to make the "Total" column. Each day, as cash is received, it must be entered on the credit side of the book opposite the customer's account, and discounts and allowances noted in the column provided. To ensure accuracy, the credit side should be compared periodically with the Cash Book entries. The necessity for this book may not at first be apparent, but in practice it will be found to well repay the time and trouble required to keep it. It should, however, be stated that the book in itself is not essential to the double entry system of accounts.

Invoice Book, or Purchasers Day Book.—In dealing with the Purchases, the system of ordering the various stores, &c., for use at the works should be touched upon.

All orders to merchants and manufacturers for the supply of goods at the works, should come through the head office, and the manager should be supplied with a Stores Requisition Book of which a specimen ruling is given in Form 11.

No. 11. THE EASTVILLE BRICK CO.

Eastville.. 189

To the Head Office.

Please order the following stores required at the Works in accordance with the undermentioned particulars :—

Name and Address of firm..

....

....

Description of Goods ....

Quantity required................................ ....

Price................................

Remarks......... ....

....

....

Manager.

The head office, on finding the Manager's requisition in order, should forward an order to the firm supplying the goods, as follows :—

No. 12.

No......... ...

From
The Eastville Brick Co.,
Head Offices,
Redbank Street,
London, E.C.

..................189...

To.......................

....

....

Please deliver the undermentioned goods to our Works at Eastville.

Quantity.	Description of Goods.

For The Eastvillle Brick Co.,

....

Orders are only recognised when given on this form.

Accounts to London Office. Advice Notes to Works.

On receipt of invoices they should be thoroughly examined, the works manager passing them as to quantities, and the office making themselves responsible for the correctness of prices, extensions and additions. For the purpose of fixing the responsibility, each invoice should be stamped by means of a rubber stamp, thus :—

Examined as to

Quantity..

Price.................. . ...

Extensions, Additions & Discounts........................

and the initials of the party examining, affixed.

Previous to paying accounts, the invoices when finally settled should be entered in the Invoice Book, which it is recommended should contain analysis columns on the lines laid down in the appendix. These columns should be supplied with headings for the purpose of dividing the purchases under the most important items of expense, such as coal, materials, repairs and renewals, etc., and any additional columns and heading necessary by reason of the special nature of the manufacture may be added at will.

Here, again, it is especially necessary that a clear distinction should be made between Capital items and those affecting Revenue, especially in cases where new yards are being started, or old yards extended.

It may not be quite clear to all as to the exact difference between Capital and Revenue items, so that a few remarks on this point may be useful.

Any money paid for wages, etc., or goods purchased, for the purposes of enhancing the value of the yard, or increasing its earning capacity, is of the nature of capital expenditure, and is not chargeable against the profits of the concern.

Revenue items consist of charges against profits in the shape of the ordinary expenses of the business, which are incurred in order to produce and sell the firm's goods.

There are many side issues in connection with Capital and Revenue expenditure, which can only be decided by a knowledge of the special facts of the case.

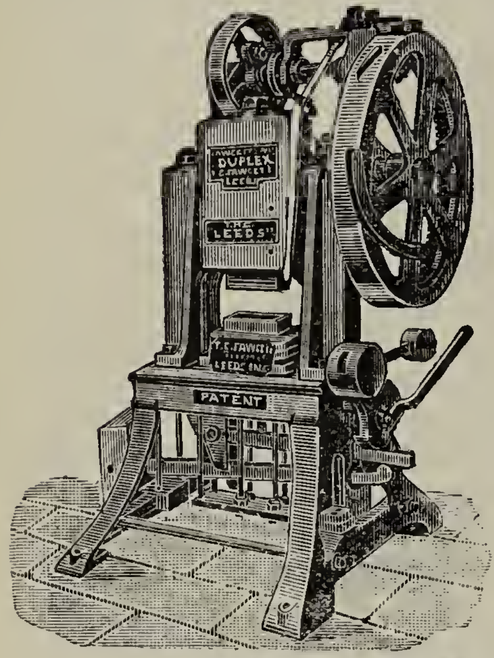
Care should be taken to charge a proper share of any Renewal to Revenue. For instance, suppose an old boiler is being replaced by a new and much more expensive one, it would be necessary to debit at least an amount equal to the value of the old boiler in the books to Repairs and Renewals (revenue), and the difference might then be charged to Machinery and Plant (Capital.) Example :—Suppose a boiler originally cost £250, and having been depreciated to £150, stands at the latter figure in the books. A new boiler is bought for £350. Charge £150 to Renewals, and £200 to Machinery and Plant.

In most brickyards the largest account payable every month is that for railway carriage, and this should be very carefully checked with the daily output return, and the following points noted :—(1) That agreed rates are charged. (2) That items for goods sent "carriage forward" do not appear. (3) That agreed arrangements with the Railway Co. as to weights are carried into effect.

Sales Ledger.—Purchases Ledger.—These may be passed without comment as similar books used in any other business will suffice, and the specimen entries in the appendix explain themselves.

THE "LEEDS" BRICK PRESS

With Fawcett's Patent Stopping and Dead-weight Thicknessing Motion and Differential Pressure.



This Press is very largely used for pressing glazed bricks, which require to be all of exact equal thickness. It will press about 4,000 bricks per day with one boy to operate it, and will press them all of one exact equal thickness, although the quantity of clay may vary half-a-pound; this is done by the patent compensation arrangement of bottom moveable panel with levers and weights.

It is also suitable for pressing all kinds of plain and ornamental, red and glazed bricks, tiles, and terra-cotta work.

It is also fitted with my patent differential purchase gearing, for giving double purchase while pressing the brick, which is a very necessary and advantageous feature over other Presses.

The Machine is substantially built, and of the best materials; all bearings are bushed with best gun metal, and of extra large sizes. The pressure is obtained by our well-known patent toggle-motion levers, which are all of the best crucible steel; all the working parts can be seen while the machine is at work, and are easy of access for oiling, etc. It is very easily and quickly adjusted for different thicknesses of bricks. It is also fitted with automatic gear for stopping the pressing head at the top, after pressing the brick, and automatically lifting it out of the mould ready for taking away by hand instead of by the usual pushing arm; another brick is then put on, and by moving a small handle close to the operator, the machine starts and completes another cycle of operations.

THOS. C. FAWCETT, Ltd.,

Whitehouse Engineering Works, Hunslet Road, LEEDS.

Makers of Patent Semi-Dry and Plastic Machines, Steam and Hand Presses, Pug Mills, Solid and Perforated Bottom, Clay Grinding Pans, Clay Crushing Rollers, Clay Mixers, Sieves, Engines, Shafting, and

GENERAL BRICK & CEMENT MAKING PLANT.

ILLUSTRATED CATALOGUES ON APPLICATION.

Impersonal Ledger.—This ledger will contain all the items for revenue and expenditure except any items which it may be deemed advisable to keep in the private ledger.

It will be noticed that certain items for wages are shown in the specimen, but being incurred on capital they are afterwards transferred in one total to the account in the private ledger on which they have been incurred.

Private Ledger.—In this ledger should be kept the private accounts showing the values of the firm's properties, loans and partnership capital, and the profit and loss accounts and balance sheets are usually incorporated in this ledger.

No. 13. Monthly Summary of Trading from.................................... to....................................

Month.	Bricks made.	Coal.		Wages.		Materials.		Repairs and Renewals.		Salaries.		Agents' Commission.		General Expenses.		Rates, Taxes and Insurance.		Bad Debts.		Depreciation.		Total.		Bricks Sold.	Sales.	Deduct.		Total.	Selling Price Per M.
		Actual	Per M.	Actual	Per M.	Actual	Per M.	Actual	Per M.	Actual	Per M.	Actual	Per M.	Actual	Per M.	Actual	Per M.	Reserve 2% on Sales.	Per M.	Reserve	Per M.	Actual	Per M.			Carriage and Carting	Discount		

THE SLAKING AND STORING OF LIME AND CEMENT.

We have recently read a long and very important memoir by Monsieur H. Le Chatelier, whose name is well known as an authority on pyrometry. This memoir details the results of numerous experiments which Le Chatelier has made regarding the slaking and storing of lime and cement. We give the following condensation in which will be found the main results which have been obtained. The rate of slaking in lime varies with the degree of compactness of the product, the porous lime obtained by the calcination of calcium carbonate at a comparatively low temperature (900° C.), becoming at once completely hydrated when brought into contact with some water, whilst the more compact form, prepared by decomposing a fusible lime salt, *e.g.*, the nitrate, requires from 24 to 48 hours, The presence of fusible substances, *e.g.*, silicates, aluminates, etc., retards the operation ; as does also magnesia, but this influence is counteracted by increasing the temperature of the water employed for hydration, or by the admixture therewith of about two per cent. of calcium chloride.

In the case of hydraulic lime, the proportion of free lime should be reduced to a minimum, since when hydrated it contributes nothing to the hardening of the mass, and when unslaked tends to reduce the setting power. In practice, the former evil is obviated by a proper selection of the materials—limestone and fuel—and the latter by slaking at a high temperature, *i.e.*, arranging the heap so as to preserve the heat evolved during hydration. In the laboratory, hydraulic lime is best slaked by immersing the vessel in a boiling saturated solution of calcium chloride.

The process of slaking is divisible into four stages in practice, the first being one of simple absorption of water. The mixture being then shovelled up against the face of the main heap, is warmed in contact, and also evolves heat by the chemical action going on ; thus a portion of the added water is evaporated. In the third stage the mass cools, and moisture is fixed by the silicates, although some of the free lime still remains unslaked. That this is so may be proved by quickly heating a sample to 150° C. in a tube, whereupon moisture will be deposited at the upper end, though the temperature is too low to eliminate water from calcium hydrate.

In the final stage the unslaked lime removes this water from the silicates, and becomes completely hydrated without any access of external moisture. The operation is simple, the interstitial atmosphere of the heap containing aqueous vapour at a tension equal to that of the dissociation of the hydrated silicates present ; the lime continually absorbs this moisture, which is replaced by a fresh quantity released by the silicates, the speed of the operation varying directly with the temperature.

These necessary stages are frequently curtailed in practice to the detriment of the product, a sufficient time being essential to enable hydraulic lime of good composition to slake properly, whilst that which becomes quickly and thoroughly hydrated is sure to be of poor quality.

To enable cement to attain the requisite degree of hydration of the free lime, storage—preferably in silos—is indispensable. The changes it then undergoes correspond to the fourth stage in the slaking of hydraulic lime, though they are accomplished more gradually by reason of the lower temperature prevailing. The absorption of moisture from the atmosphere being precluded, the addition of a sufficiency of water is necessary to produce the maximum benefit from the process.

The successive crushings employed in grinding hydraulic cement, result in the pulverising of the more completely hydrated portions first, and thereby give rise to differences in the quality of the product. This defect is avoided by a certain addition of water previous to crushing.

By maintaining the stored cement at higher than the ordinary temperatures, say 100° C., the time of storage could be reduced to about 14 days. Such a course would facilitate the manufacture of natural cements—free from aluminates, and therefore less fusible and more easy to kiln. Such cements, although in the absence of aluminates the combination of silica and lime does not ensue, may, when devoid of free lime, have greater powers of resistance than Portland cement. Consequently, proper storage, by tending to eliminate this element of weakness, affords a means of reviving the said industry.

The presence or absence of free lime may be determined as follows :—The sample is made up into a strong paste with water, and left to set, being moistened to prevent desiccation. Then, within 24 hours, the block is placed in water and heated to boiling point in less than four hours, the distension produced being measured by the aid of a divided mould or other suitable means.

WATERPROOFING BRICKWORK.

Some interesting results of the treatment of brickwork in a water conduit with different kinds of waterproofing material, are recounted by Mr. A. W. Hale. The author's investigations were chiefly based on the observed effects specially prepared in connection with the construction of the Croton aqueduct at New York. The practical problem was how best to treat the brickwork to prevent the percolation of water through it ; and the experiments covered a wide range, including the application of coatings of such substances as linseed oil, shellac, iron varnishes (?), aluminium acetates, oleates and stearates, sodium silicate and calcium chloride, varnish, pitch, tar, and a number of proprietary compounds. The hydrocarbons usually regarded as most suitable for waterproofing brick and stone are found on exposure to air, to oxidize and disappear. Portland cement gave the best results ; and the only coating which ranked with it in impermeability was a hydrocarbon compound which after a time peeled off. Compounds of alumina with organic acids, and of lime with silicic acid, shared the same fate. The permeability of a brick when coated with successive washes of cement applied with a brush, diminished much more rapidly than when coated with an increased thickness of cement applied with a trowel. The percolation through a brick coated with four washes of cement diminished under a water pressure of 80 lbs. per square inch, and at the expiration of two months it ceased altogether ; the brick then remaining impervious under a pressure of 200 lbs. per square inch. This proof of the superiority of cement washing to rendering brickwork as a means of making it waterproof, is the most instructive result of the experiments.

THE LEAD COMPOUNDS QUESTION.

Practical men will hasten to obtain the report of Professors Thorpe & Oliver to the Home Secretary on the use of lead compounds in the manufacture of pottery and the effect of such compounds on the health of the workers. They will not, however, find much in it that is new or instructive. Indeed how should they? Great industrial difficulties are not likely to be solved by a few experiments made in a Government Laboratory by men whose acquaintance with the technology of the subject can only be theoretical though they may be distinguished chemists. Besides, as everybody knows, a wide difference exists between laboratory experiments and manufacture, and if these experiments are to have any real value they must be conducted by an expert who is in touch with the difficulties of practice.

Information was requested of the Professors on three heads—first, the extent to which the danger of lead poisoning may be diminished by substituting for the ordinary carbonate of lead glaze, either a glaze with a less soluble compound of lead or a glaze without lead at all; secondly, to what extent such substitutes lend themselves to the varied practical requirements of the manufacturer; and, thirdly, what preventive measures other than a change in the glaze can be adopted. The first of these is obviously a question for the chemists, the second rather for the practical potter, and the third for the doctor in consultation with the factory staff.

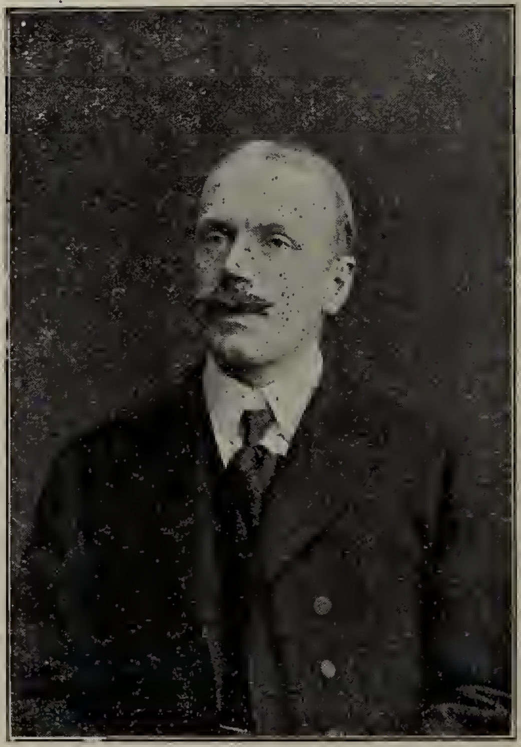
Evils undoubtedly *do* exist in connection with the use of lead, but they have been grossly exaggerated by interested persons and by journalists. Glazes *are* in use which contain no lead, and some glazes cannot be produced without it. Some fritted lead, namely the fritted double silicate, is very soluble, and therefore its use is attended with less danger. But then again the common kind of fritted lead is hardly less soluble than the ordinary glaze.

We are very much in the same position as we were before this report was published, and we feel sure that it will be received by practical men with disappointment. Half-measures never did any good. The Home Secretary, in our opinion, was ill advised to appoint Professors Thorpe & Oliver—eminent scientists as they are—to report upon such a great industrial problem as the use of lead in potting. There should have been a mixed Committee upon which should have sat chemists, doctors, manufacturers, and representatives of the factory hands. A report might then have been evolved which would have been really useful and which would have stood a chance of being accepted in the trade.

Meanwhile we warn the Government not to be led into hasty conclusions, for sweeping legislative changes might transfer to foreigners an industry now employing upwards of 70,000 hands. We are all anxious to do our utmost for the preservation of the health of those engaged in dangerous industries, but care must also be taken not to endanger the industries themselves.

We give the gist of a reply to the report by the Manufacturers themselves. They say :—" That glazes containing lead are the simplest and most reliable in practice. The enforcement of a regulation forbidding the use of this glaze would, at the present time, cause a revolution, not merely in English glazes (the only point considered in the Report), but also in the composition of the bodies they use, and in the temperature of the firings which they give to the body of the ware and to the glaze. They could not overlook the consequences that might ensue to an important English industry were it thus placed at a serious disadvantage in facing the competition of foreign manufacturers. According to the report itself the foreign manufacturers use quite as much lead in their earthenware glazes as was customary in this country. The custom of English manufacturers is to guarantee the quality of their wares, and if manufacturers could no longer give such assurances because of the uncertainty of the result of the proposed changes, it would, beyond all doubt, mean that English manufacturers would lose the bulk of their trade, as at present customers prefer to have English goods, rather than foreign goods at a lower price, without any such assurance. The manufacturers are prepared to accept the proposal to abolish the use of 'unfritted' lead in glazes. In future they will reduce to a fritt all the lead used in the glazes. They also agree that the time has come when the use of raw lead in glazes may be prohibited."

THE CLAYWORKERS' BILLIARD HANDICAP.



MR. RALPH T. HUGHES.

We give a portrait of Mr. Ralph T. Hughes, of the Normanby Brick Company, Ltd., Middlesbrough, who holds the proud distinction of being the winner of the Clayworkers' Billiard Handicap, played off during the recent Building Trades Exhibition. The honour, however, is somewhat a barren one, as the arrangement was that the winner had to give the proceeds of the handicap to the Clayworkers' Institute Benevolent Fund. [We trust he may never need to claim it.—Ed.] Nine clayworkers, from all parts of the country, contended, each man cheerfully contributing 5s., and making the total sum won £2 5s.

Mr. Hughes is Managing Director of the Normanby Brick Co., Ltd., of Middlesboro', with which he has been connected for the past 15 years, making glazed and red facing bricks. He is also patentee of Hughes' brick press. The fact of his being the brother of Sir Alfred Collingwood Hughes, Bart., makes him none the less a brother chip of the right sort.

THE INSTITUTE OF CLAYWORKERS.

ANNUAL MEETING AND DINNER.

ENTHUSIASTIC GATHERINGS. ELECTION OF PRESIDENT & VICE-PRESIDENT.

THE FOURTH ANNUAL MEETING of the Institute of Clayworkers was held during the progress of the Building Trades Exhibition, at the Royal Agricultural Hall, Islington, N., on Wednesday, May 3rd. There were between 50 and 60 members present and the proceedings were characterised by much enthusiasm.

Mr. EDGAR WEBSTER (Chairman of the Committee) read the report as follows :—

> Your Committee have much pleasure in stating that the growth of the Institute has been very satisfactory, 99 members having joined during the past year.
>
> One of the principal reforms your Committee were able to effect during the last 12 months was that of obtaining a computed weight for the carriage of bricks on the Great Eastern Railway. Several deputations waited upon the General Manager of the Company, who issued to brickmakers served by the line a scale of computed charges.
>
> These charges have been published, and may be obtained.
>
> Another practical outcome of the Institute is the formation among the trade of the "British Clayworkers' Mutual Insurance Corporation, Limited," which was set on foot during the Clayworkers' Trip to Copenhagen, and resulted in the formation of the Corporation, with the working of which you will all be familiar. The Company so far has been a great success.
>
> The appointment of a paid secretary has had much to do with the steady increase of the membership, as it is a great advantage to have someone always in evidence at the Institute to open out its advantages.
>
> The Committee suggest that the Institute is likely to profit by the election of a President (who will retire every year), and a Vice-President (who will subsequently succeed to the President's office).
>
> It is thought that by electing brickmakers from different districts each year, stimulus will be given to the work of the Institute all over the country, and that a better opportunity will thus be afforded of taking up local questions.
>
> The audited accounts are very satisfactory, and it will be seen that your Committee have cleared off an adverse balance from last year of £112 9s. 5d., and the Committee confidently hope that next year there will be a substantial sum in hand.

Dr. SUMMARY CASH ACCOUNT, 1ST APRIL, 1898, TO 31ST MARCH, 1899. *Cr.*

	£ s. d.	£ s. d.
To Subscriptions—		
234 at £1 1s. 0d.	245 14 0	
1 at £0 13s. 0d.	0 13 0	
		246 7 0
		£246 7 0

	£ s. d.
By Balance due to Treasurer	45 11 11
,, Rent to September 29th, 1898	56 5 0
,, Service, fuel and light	12 19 0
,, Furniture and Fittings—Shelving per Horsford and Davies	2 16 6
,, Printing	12 17 0
,, Bank Charges and Commissions	0 4 11
,, Balance at Bank	112 10 8
,, Cash in Treasurer's hands	3 2 0
	£246 7 0

Dr. BALANCE SHEET, 31ST MARCH, 1899. *Cr.*

	£ s. d.	£ s. d.
To Creditors, as per statement supplied by the Secretary—		
Rent to 25th March, 1899 ..	35 0 0	
Service, fuel and light, to 25th March, 1899	9 0 0	
Printing	1 7 0	
"British Clayworker" supplied 294 copies at 7s.	102 18 0	
Secretary's Salary	50 0 0	
Postages	3 16 3	
		202 1 3
,, Surplus, being excess of Assets over Liabilities		8 6 3
		£210 7 6

	£ s. d.	£ s. d.
By Fixtures, Fittings, Stock of Stationery, etc., as at 31st March, 1898	45 14 4	
Additions per Horsford and Davies	2 16 6	
		48 10 10
,, Outstanding Subscriptions per Secretary's statement		46 4 0
,, Balance at Bank		112 10 8
,, Cash in Treasurer's hands		3 2 0
,, Collection of Bricks (not valued)		—
		£210 7 6

We have examined the above Cash Account, with the Vouchers and Receipt Books, and certify it to be a correct Statement of the Receipts and Payments therein disclosed, and that the Balance-sheet correctly states the Assets and Liabilities, as shown by the papers produced, but we have no means of testing the value of the outstanding Subscriptions.

FRANK IMPEY & Co.,
Chartered Accountants.

April 28th 1899.

Before moving the adoption of the same, the Chairman congratulated the meeting on its numbers—a very large increase on former years—and he further congratulated the members of the trade upon their continued prosperity. Some of the members might think they had done little work during the past year, but he could assure them that their Committee had done its utmost in the interest of clayworkers; and they might justly claim, if nothing else, that they had welded together in good fellowship a band of men who had hitherto been looked upon as irreconcilables. (Cheers.) The balance-sheet might not at first sight appear very satisfactory, but it should be remembered that last year the Institute was £135 in arrears, and that all this sum had been cleared off with the exception of £40 3s. 7d. Mr. Montgomery had agreed to pay the sum of £25 towards the deficit, and one or two members of the Committee had subscribed £3 3s. (Applause.) There was, however, one unsatisfactory item, and that was the outstanding subscriptions which they had been unable to collect. He thought the meeting would agree that it was hardly fair of certain members to have taken advantage of the Institute, and yet to refuse to pay their due.

The CHAIRMAN moved the adoption of the report, which was seconded by Mr. W. Cunliffe (Kettering), and carried unanimously.

Mr. MONTGOMERY proposed the election of a President and Vice-President of the Institute. His idea was that if the Institute changed its President every year, the Vice-President succeeding to the President's chair, it would very materially stimulate the work of the Institute. What they wanted was a representative in different parts of the country, who, as their President, would obtain new members, and who would bring the Committee into touch with the needs of the district in which he resided. They had got their engine ready, and all that was now required was to get up steam. Their President now was Sir Alfred Hickman, M.P., and he had been so since the formation of the Institute, but the speaker felt certain that Sir Alfred, although a brickmaker, had neither the time nor opportunity of devoting much time to the interests of the Institute. While thanking him for past services, he begged to move that the new President be Mr. Edgar Webster, their Committee's Chairman. Mr. Webster needed no introduction. He had been their Chairman from the beginning, and had stuck to them through good and bad times, and had always shown himself most energetic for their welfare. He knew that, in proposing him for this office (and he was sure Mr. Webster would deem it an honour to fill it) he would have the entire support of the members present.

Mr. C. B. BROAD (Paddington) seconded, and added that he had known Mr. Webster since the Institute was started, and was sure he would make an excellent President.

Mr. Alderman BLADES, J.P. (West Bromwich), added further words of commendation, and the motion was unanimously carried.

The next business was the election of a Vice-President.

Mr. F. JEWSON, J.P. (Earith), begged to propose Mr. J. C. Hill, of Fletton and Ponders End. Mr. Hill was known to most of them as an enterprising and energetic man, a man controlling a large business and possessing great influence. He felt sure that if he would accept office he would make an admirable Vice-President, and in due time President of the Institute.

Mr. Alderman BLADES seconded, extolling Mr. Hill's business capacities.

The next business was the election of the Committee, which was taken *en bloc*, with the exception of the names of Messrs. Courtis, Wheatly and Wyndham, who had requested their names to be removed, owing to their inability to attend meetings. The following new members of the Committee were then duly elected:—

Mr. W. CUNLIFFE, Kettering and Kingston-on-Thames.
Mr. CHAS. CUNNELL, Norwich.
Mr. MARK GENTRY, Hedingham.
Mr. CHAS. MAJOR, Bridgwater.
Mr. J. J. ROBSON, Gravesend.

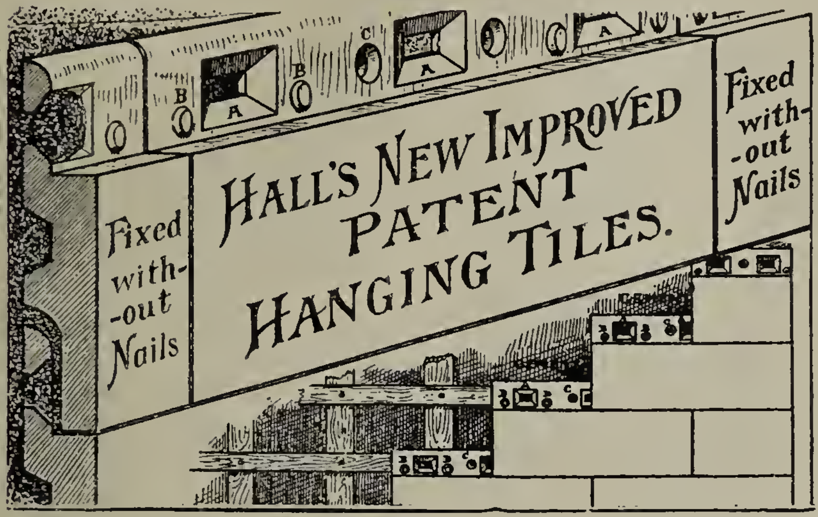
Mr. MONTGOMERY proposed that the sum of £3 3s. be paid to the Auditors who had hitherto done the work excellently well for nothing. Carried.

The CHAIRMAN at this moment asked the members present if they would kindly assist in liquidating the adverse balance, and they replied with such alacrity that it was impossible to take down names fast enough. In a few minutes the whole amount had been subscribed, and double the amount might as easily have been obtained, so eager was everyone to participate. The following is a list of the subscribers:—

	£	s.	d.
Edgar Webster	1	1	0
R. P. Cafferata	1	1	0
S. & E. Collier	1	1	0
G. M. Callender	1	1	0
C. B. Broad	1	1	0
John Knowles & Co.	1	1	0
C. Major	1	1	0
Skey & Co.	1	1	0
Ed. Webb	0	10	6
W. Cunliffe	0	10	6
Chas. Cunnell	0	10	6
Messrs. Matthews & Sons	0	10	6
J. H. Blades	0	10	6
H. Derrington	0	10	6
R. T. Hughes	0	10	6
Sidney Lee	0	10	6
Wm. Poulter	0	10	6
Arthur Goodall	0	10	6
H. L. Stinson	0	10	6
J. R. Gibson	0	10	0
Mark Gentry	0	10	1
	£15	3	7

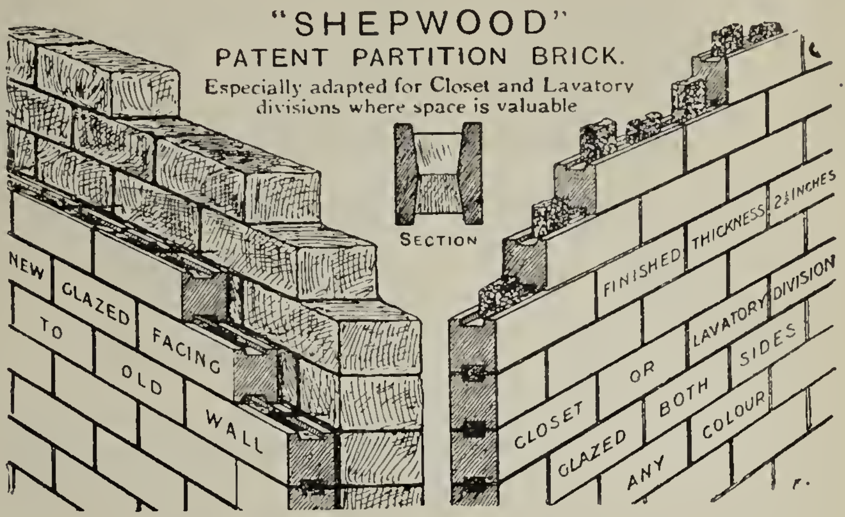
THE DINNER.

THE Institute dinner was held on the same day at the Royal Agricultural Hall, and proved the wisdom of the Committee in arranging for it at that place, as some 65 members—the largest gathering on record—sat down. The proceedings were marked by the utmost cordiality. Mr. Webster, as the new President, made an excellent chairman. Mr. Gibson (Buckley) proposed his own and everybody else's health, Mr. Chas. Major made the Chairman blush, Mr. Montgomery tried to say something pleasant, and inbetween the toasts Messrs. Arthur Brown, Hill (Stanley Bros.), and Arthur Turner (Koppel & Co.) charmed the audience with their songs. At an early hour a move was made to witness the last round of the Clayworkers' Billiard Handicap.



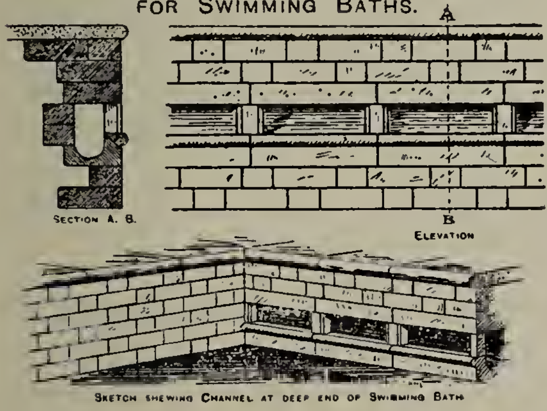
"SHEPWOOD" PATENT PARTITION BRICK.

Especially adapted for Closet and Lavatory divisions where space is valuable


Section
New glazed facing to old wall
Finished thickness 2½ inches
Closet or lavatory division glazed both sides any colour

TILTMAN'S

Patent White Glazed Scum Channels for Swimming Baths.



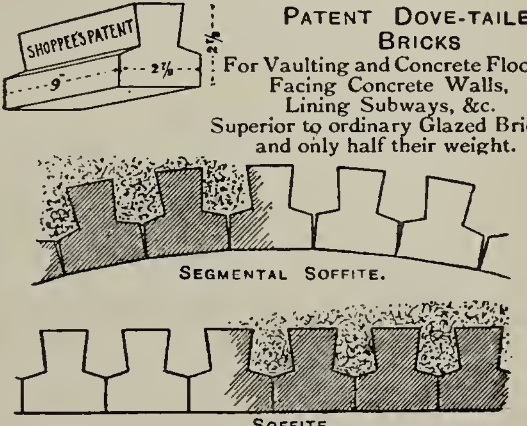
ESTABLISHED 1795.

CLIFF'S

(Branch of the Leeds Fireclay Co., Ltd.)

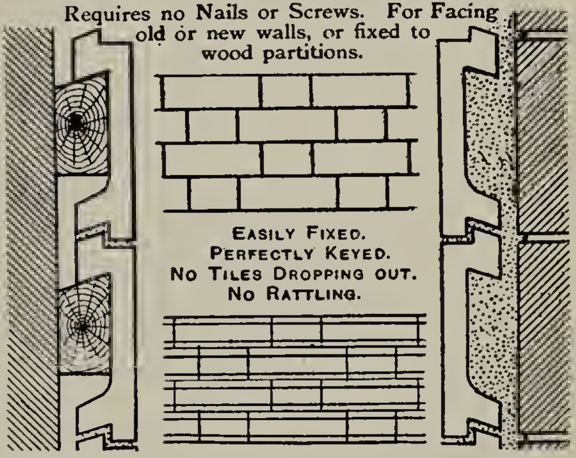
SHOPPEE'S

Patent Dove-tailed Bricks
For Vaulting and Concrete Floors, Facing Concrete Walls, Lining Subways, &c.
Superior to ordinary Glazed Bricks and only half their weight.



Patent "GRIP" Wall Tile.

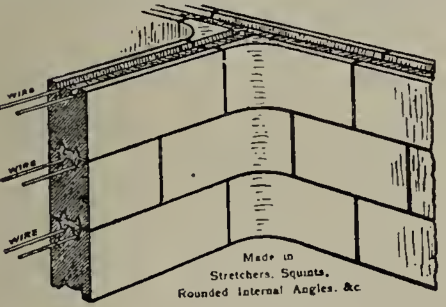
Requires no Nails or Screws. For Facing old or new walls, or fixed to wood partitions.



TILTMAN'S

Patent Partition Brick

For Partitions between Slipper Baths, Open Dressing Boxes, W.C.'s, Urinals, Lavatories, &c.

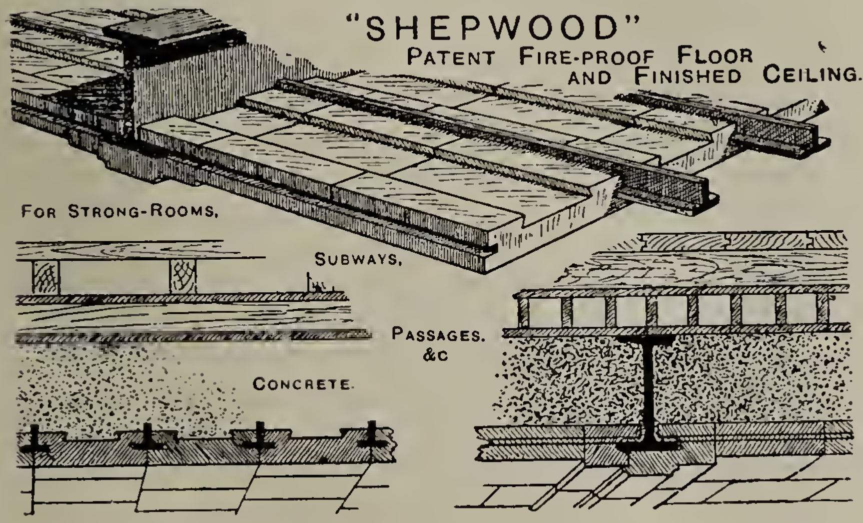


Patent Tiles.

Partition Bricks.

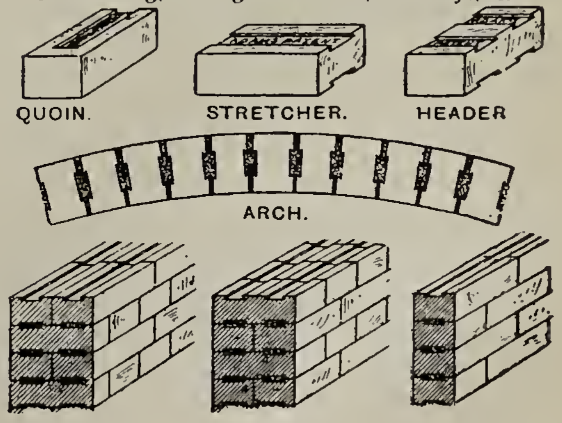
Scum Channels.

"SHEPWOOD" PATENT FIRE-PROOF FLOOR AND FINISHED CEILING.



ADAMS'S

Patent Dovetailed-Keyed Bricks.
For Vaulting, Lining Reservoirs, Subways, &c.



THE BRITISH CLAYWORKERS' MUTUAL INSURANCE CORPORATION, Ltd.

REPORT OF GENERAL MEETING.

Interim Dividend 10 per Cent. Bonus 10 per Cent.

£16,000 available for Claims.

A General Meeting of the Shareholders in the above Corporation was held in the Board Room, Royal Agricultural Hall, Islington, on Thursday, May 4th, at 4 o'clock in the afternoon. Mr. Jno. C. Hill (Chairman) presided. Other Directors present were Messrs. Alderman Blades, J.P., E. P. Collier, J.P., W. B. Hughes, H. Greville Montgomery (Secretary), and H. J. Cobbett, of Messrs. Aylward & Cobbett, Solicitors. There was a very fair attendance of Shareholders.

The Secretary having read the notice convening the meeting,

The Chairman briefly stated the reason for their holding a General Meeting at that time. The Directors felt that it would be an opportunity of meeting Shareholders in the Corporation from all parts of the country, and they were anxious to inform the Policy Holders and Shareholders of their position at once instead of waiting until November, which was the time of their Annual Meeting. The Corporation had had a most remarkably successful ten months' work, and they were well within reach of their year, with a splendid record. (Cheers.) He felt sure that those firms which had been anxiously watching the results of their undertaking would now realize that the Corporation had been started on a sound basis, and was in a position to deal with any business it might be entrusted with. [The Chairman then detailed the exact amounts that had been received and paid for the nine months ending March 31st last, which, as they will appear in the Annual Report, need not be mentioned here.] The total amounts received were—on account of premiums, £2,589 9s. 6d.; shares, £1,498, making a total of £4,087 9s. 6d. This with dividends on capital invested, brought up the total to £4,110 18s. 4d. They had paid in claims the sum of £514 17s. 6d., and their total expenses, including the above and the incorporation of the Company (amounting to £223), came to £949 19s. 4d. This left them a balance of £3,160 19s. (Cheers.)

And all this in spite of the fact that their rate of premium was fixed as low as that of any other company—in fact it was their company that had brought down the rates all round, so that brickmakers had something to be thankful to them for, even if they did not insure with them. He could not promise a lower rate, but would assure them that the Directors would consider the best interests of the insured. Last year when the Tariff Offices were asking 30s. per cent. for brickworks, they offered the same advantages at 7s. 6d. per cent., and it would have surprised no one if the Directors had seen fit to slightly raise this premium for the ensuing year. But they had done a better thing than that, they saw their way to promise a rebate of ten per cent. on the renewal of policies. (Cheers.) Further than this, they proposed a dividend of ten per cent. upon the shares. (Cheers.)

There was one charge for which no allowance had been made, and that was the fees of the Directors. No one would dispute that there had been much arduous and trying work to be done, but the Directors, after due consideration, had decided not to accept any fees for their services this year. (Applause.)

The Chairman thought that the shareholders and policy-holders alike would consider the Corporation was in a very satisfactory condition, and he hoped that they would find that time would only add to their financial strength, and to the confidence the brick trade would repose in them. (Applause.) The Chairman asked whether the shareholders themselves would agree to the proposal of a dividend and bonus, whereon

Mr. Mark Gentry (Hedingham), in proposing the resolution, thought the statements made by the Chairman were eminently satisfactory and felt that those interested were to be congratulated on having their affairs in such good hands.

Mr. Webb (Oxford) seconded, and the proposal being put to the meeting was carried unanimously.

The Chairman having invited questions,

Mr. Mark Gentry asked whether the bonus would be returned to shareholders on this or next year's premium.

The Chairman stated that the bonus would be deducted from next year's premium.

A Shareholder asked whether he would be in order if he called attention to the Brickmasters Employers' Liability Association, Ltd., which according to particulars he had received possessed assets of over £300,000 and quoted only 6s. premium as against the Company's 7s. 6d. He thought their Company stood in a very poor position, financially, as compared to the other, while its lower rates were likely to attract the trade.

An animated discussion followed, and it was some time before the truth of the matter could be elicited, but it was ultimately stated by a shareholder that the company in question had no subscribed capital at all, and that its so-called "assets" could only consist of the amount of wages upon which insurance was paid. Further that the 6s. premium, as quoted, was not a relief from all liability, but a first call only, leaving each shareholder liable for further calls that might be necessary to meet claims.

A Shareholder: What would be the assets of the British Clayworkers' Corporation if worked on similar lines as the company mentioned?

The Chairman: More than double the amount. (Cheers.)

Mr. E. P. Collier pointed out the advantage of knowing their liability, as they did in their Company, and stated that their premium income would be considerably increased when the adjustment of wages was made at the end of the year.

The Chairman stated that the Company were desirous of extending their operations to the building trade, in which there was no greater risk than in their own business.

After some remarks by Mr. Alderman Blades, J.P., and Mr. W. B. Hughes, a cordial vote of thanks to the Chairman concluded the meeting.

ARTHUR KOPPEL LIGHT RAILWAYS LONDON LEADENHALL STREET 96

NOTICE OF REMOVAL.

ARTHUR KOPPEL,
Manufacturer of Portable Railway Material and Wagons,
Has removed from 96, LEADENHALL STREET, E.C., to
PENINSULAR HOUSE,
MONUMENT STREET,
LONDON, E.C.
Telegraphic Address :—“ ALIGHTING, LONDON.”

PLEASE NOTE NEW ADDRESS ON ALL CATALOGUES AND PAMPHLETS.

WORKMEN'S COMPENSATION.

The following appeared in the "Pall Mall Gazette" of May 10.

The result of an interesting experiment made last year was reported at the general meeting of the British Clayworkers' Insurance Corporation, Limited, which was held at the Building Trades Exhibition a day or two ago. This Company sprang into existence close upon twelve months ago, in consequence of the demands made by the tariff offices, which were unwilling to insure against risks incurred under the Workmen's Compensation Act under 30s. per cent. So far was this in excess of the estimated price of the employers that they were not even willing to arrange with the non-tariff offices, which were prepared to insure at half this rate. It was felt that 7s. 6d. was a very suitable sum, which would prove satisfactory to all parties concerned. Consequently a company was formed and share capital was subscribed to the value of £14,000 in £10 shares, of which £1 per share was taken up. It appears that for the nine months ending March 31st, the corporation has received £4,110 18s. 4d., the premiums amounting to £2,500. Out of this they have paid away £514 in claims, and the remainder in incorporation fees and other expenses. There is £3,000 invested and £13,000 that can be called up. In order that there may be no unnecessary expenditure the directors have agreed to give their services gratuitously for the first year. The result gives promise of a noteworthy instance of the value of mutual insurance schemes.

The following appeared in the "Pall Mall Gazette" the next day.

The Secretary of the British Clayworkers' Mutual Insurance Company writes pointing out what he terms an error in a City Note of yesterday. We are supposed to have stated that the income of the Corporation was £4,111, that £514 was paid in claims, and the remainder in incorporation fees. As a matter of fact we said nothing of the sort. The total receipts were given as £4,111, the premiums as £2,500, and out of this it was stated that £514 was paid away in claims, and it was carefully pointed out that £3,000 was invested. The total sum actually expended, the secretary explains, was £950, which represents the figures for the first nine months of the company's existence.

We leave the shareholders of the company to judge as to who is right.

Settlement of Brickmakers' Dispute at Glasgow.—We understand that at a meeting of the Master Brickmakers' Association, held a short time ago in the Building Exchange, at which representatives of the workmen's Committee were present in conference, an amicable arrangement was arrived at, whereby the brickmakers, who had been on strike for two weeks, arranged to resume work at an advance of 10 per cent. over last year's rates.

THE WORKMEN'S COMPENSATION ACT, 1897.

GUNPOWDER EXPLOSION.

£130 COMPENSATION.

At Burnley County Court, on April 20th, before a jury, James Greaves, a blasting labourer, sought to recover £230 from the Accrington Brick and Tile Company for personal injuries sustained whilst in their employ. The action was brought under the Employers' Liability Act. The plaintiff went to work on the defendants' works at Whinney Hill, Altham, in June last year, his duty being to drill holes for blasting purposes and to charge them and fire under the direction of Alfred Whittam, the foreman for that part of the work. Greaves was a practical man, having been engaged in mines all his life. Within a week of working at defendants' place he complained to Whittam of the danger there was in keeping the powder in open barrels, and also of carrying it in an open barrel to the place where it was intended to be used. The manager ordered certain things to be made, but none of them arrived until after the accident.

On October 28th plaintiff was ordered by Whittam to drill a hole in some shale and to fire it. Having done so he got what powder he required from the magazine, and conveyed it in an open barrel to the place. After the usual preparations he told a man named Lancaster to take the gunpowder away, but the latter took the wrong barrel. Plaintiff struck a light and lit the fuse, but a spark flew into the gunpowder and an explosion occurred, in which he was terribly injured and disfigured for life. He was removed to the hospital at Accrington, where he remained for three or four weeks. He had been entirely unfit for work during the last six months, and he was told that he had lost four-fifths of his vision.

Mr. Acton, for the defence, contended that it was through plaintiff's own negligence that the explosion occurred. He should have waited to see whether the barrel of gunpowder had been removed by Lancaster. The jury, after consultation in private, found for the plaintiff, and assessed the damages at £130.

COMPENSATION FOR FALL OF CLAY.

The arbitrator (Mr. Kilburn) who, a fortnight ago, acting for his Honour Judge Raikes, heard a claim for compensation at the Pontefract County Court, brought by Thomas Heckingbottom, a labourer at the Carleton Coal & Brick Co.'s Works, has made his award. Applicant had been injurod by a fall of clay and stone, and is awarded 10s. per week previous to recovery for light employment on February 18th, and 2s. per week from then to full recovery. The full amount to April 22nd to be paid at once, and the 2s. on each Saturday. The award is with costs.

£6 FOR A CRUSHED FINGER.

At the Leeds County Court, on May 5th, before his Honour Judge Greenhow, a moulder named Charles Henry Winder, of 7, Norwich Terrace, Hunslet, brought a claim under the Workmen's Compensation Act against his former employer, Mr. William Towler, of the Globe Foundry, Water Lane, Leeds. The claim was for the sum of £50. In September last applicant was following his employment as a moulder at the Globe Foundry when his left hand was caught in the cog-wheels of a crane, crushing his fingers and palm, and incapacitating him from following his employment for eight weeks. One of his fingers, it was stated, would never regain its former use. Mr. C. Dunn appeared for the applicant. The respondents, represented by Mr. H. C. Bowling, had offered to pay applicant £3 13s., without admitting liability, but this had been declined. Ultimately his Honour awarded the applicant £6 2s. 3d., with costs.

"A SHIP NOT A FACTORY."

This was the master's appeal from an award to a workman made under the Act by his Honour Judge French, sitting at the Bow County Court. Chambers was a bargeowner, and took away in barges, manure and refuse from cattle steamers when in the Victoria Docks. The workman Flewers was making fast a barge for this purpose to the steamship Savona when, in throwing a line from the ship to the barge, he, in the dark, missed his footing, and was thrown into the water, and claimed damages for injuries he received, which, however, were not of a very serious character. The County Court Judge found against the master, holding, in effect, that a ship in a dock was a "factory," and that it made the master no less liable for accidents to his workmen because on that factory no machinery was used.

At the conclusion of the argument,

Their lordships allowed the appeal. The Act said docks, under circumstances, were to be treated as "factories" if machinery were used. There was nothing in the Act which said that a ship became a "factory" merely from the fact that it was moored in a dock.

FINGERS IN THE PRESS.

A youth named John Roberts, son of Mr. Morris Roberts, Cwmalis, Vroncyssylltau, met with an unfortunate accident whilst at work at Penybont terra-cotta works. One of his hands became entangled, and was badly crushed in a steam press by some means or other, and two of his fingers were taken off.

BRICKMAKER FALLS FROM A KILN.

An inquest was held upon the body of James Haxell, of Walton, Suffolk, brickmaker's labourer.—Dr. Gideon, of Walton, said he was sent for about a quarter to ten o'clock on the morning of the 14th inst. He at once attended, and examined the body of the deceased. Life was extinct, but had only been so a short time. There was an abrasion on the top part of his head, but no external fracture. There was, however, a fracture of the base of the skull. He was of opinion that death arose from fracture of the skull. He had not recently attended the deceased; he had attended him a considerable time ago, but could not say for what cause.—Thomas Rogers said he was working with the deceased at the Brick Works in the morning of the 14th inst. That was the first day the deceased had been at work during the week as he had not been well: he did not know what he had been suffering from. He did not appear to be well that morning, but said he felt better. He did not complain of giddiness. Witness was on the top of the kiln, and the deceased came up the ladder to speak to him. He had got to the top of the ladder, about twelve feet above the ground, when he reeled, and apparently sat down, and before witness could get to him he had fallen to the ground. He did not utter a sound. Witness went down to him at once, but he did not move; he was apparently dead. The deceased had come to work, but had not commenced. He had got on to the top of the kiln. He did not attempt to save himself.—Alice Haxell, daughter of the deceased, said her father was fifty-six years of age. Deceased had not been at work during the early part of the week, but he went on Friday morning. He had not been well, and had been suffering from fainting fits. He appeared to be much better on Friday morning, and said he was capable of going to work. He had a fainting fit about six o'clock on the previous Wednesday.—The Jury returned a verdict of "Death from fracture of the skull, caused by an accidental fall."

TRADE NOTES.

Brickmaking at Dalry.—Messrs. David Logan & Sons, Ltd., Glasgow, have just had erected on the site of the old furnaces, near Dalry railway station, plant of the most improved description for manufacture of bricks for building purposes. There is a 12-chamber Hoffmann kiln and a grinding mill and moulding machine able to produce 12,000 a day.

Fire at a Scotch Brickworks.—A fire occurred recently at the Darnley Brickworks, Nitshill, near Glasgow, belonging to Mr. Allan Kirkwood. A detachment of the Glasgow Fire Brigade from Queen's Park Station was sent to the scene of the fire, and succeeded in limiting the damage to the building in which the fire originated. The damage, which is estimated at £200, is covered by insurance.

Brickmaking in Benin.—The Niger Coast Protectorate are now making bricks in the city of Benin by machinery from native clay. Two Europeans are engaged in the work. Some of the bricks are of excellent quality, and the Residency is being built of bricks. Brickmaking and building are considered important undertakings for the future health of the coast.

Cement and Brick in South Africa.—The cement, brick, and the tile industries in South Africa are rapidly increasing in number. Near Cape Town there is a cement works employing fifty hands and turning out about 7,000 casks of Portland cement every month. In Cape Town proper there are five brickmaking works; the rest of the fictile manufacturers in Cape Colony number nine. In addition, Natal has one, the South African Republic six, Bloemfontein in the Orange Free State, and Salisbury in Rhodesia, each one, while Bulawayo has two.

Death of a Brick Co.'s Secretary.—We regret to announce the sudden death of Mr. F. L. Morgan, who for forty years was a prominent figure in Dublin. He began his career with the Mining Company of Ireland, and left them to become secretary to the Dublin and Wicklow Manure Company, a post he held for twenty-three years. He more lately became Secretary to the Brick and Tile Company, whose Board meeting he attended the day before his death. Mr. Morgan was for forty years a member of the Masonic Order, and his genial disposition made him a general favourite.

Death of a Scotch Potter.—The death is announced at an advanced age of Dr. W. A. Gray, a gentleman who has been well known in Portobello for many years. In 1856, shortly after coming to Portobello, he acquired the property at the foot of Pipe Street called the Mid-Lothian Potteries—one of the first of the kind in the burgh. At that time the works were not in operation, having been vacated by Messrs. Rathbone & Co., and when Dr. Gray restarted them he did so on different lines, and in a very short time developed a good trade. For the last fifteen years the business has been conducted by his son, Mr. Alexander Gray, who is one of the representatives of the burgh in Edinburgh Town Council and a Judge of Police. Although the deceased never took any active part in public affairs, he was an active business man, and was well known and much respected.

An American Tile Combination.—A correspondent writes:—The Encaustic Tile Company of America, incorporated under the laws of New Jersey with a capitalisation of $7,000,000, of which $3,000,000 is preferred stock and $4,000,000 common stock, is expected to take in every tile company in the United States, of which there are sixteen all told, including the American Encaustic Tile Company of Zanesville, O.; the Vitrified Tile Company of Brooklyn; the Art Marble Company of Chicago; the Trent, the Providential, the Old Bridge Enamel Brick and the Maywood Art Tile Companies of New Jersey; The Robertson Art Tile, the Star Encaustic Tile, the Beaver Falls Art Tile, and the Penn Tile Companies of Pennsylvania; the Tarrytown Tile Company of New York; the Cambridge Tile Company of Covington, Ky.; the United States and the Columbia Tile Companies of Indiana and the Mosaic Tile Company of Zanesville, O. The prospectus of the new company declares that all the companies were profit owners even during the long period of sharp competition, but under the combination the economies and maintenance of prices will very largely increase the earnings, and it is calculated that the new company will earn 7 per cent. on its preferred stock, and fully 13 per cent. on the common. Mr. Low, of the Low Art Tile Company, states, however, that the list comprised all the concerns making tiles in the country excepting his own, which was not in the deal and would not become a party to the combination. The matter of a tile trust has, he said, been under consideration for some months and he has been expecting to hear of its being carried through for some time past. Being outside, he was not familiar with the plans of the promoters, but the project did not appeal to him when first broached and his firm will, he thinks, stand a better chance outside of the combination than it would as one of its constitutional parts.

Visit to a Belfast Brickworks.—The opening meeting of the summer session of the Belfast Mechanical and Engineering Association was held on Saturday, the 6th May, when, by the kind permission of Mr. H. R. Vaughan, the members paid a visit to the Lagan Vale Brick Works. These works, as their name implies, are favourably situated on the banks of the River Lagan, with an abundance of clay within easy reach, and are equipped with the most modern machinery arranged to minimise manual labour as much as possible. The driving plant for the works consists of two Lancashire boilers supplying steam at 100lbs. pressure to a horizontal non-condensing engine capable of developing 200 i.h.p., and two duplex boiler feed-pumps. The power is transmitted from the engine to the second motion shaft by means of ropes. The brick-making machinery, which was designed by Mr. Vaughan, comprises two complete plastic clay wire-cut machine plants for making solid, perforated, facing, and moulded bricks, and a number of brick-presses and other machinery. The plant will produce from 30,000 to 40,000, and the smaller one from 20,000 to 25,000 bricks per day. The bricks are dried in sheds arranged on the trolley tunnel system, heated by the exhaust steam from the engine, and are fired in patent continuous burning kilns. These kilns are divided into a number of cells, so arranged that the operations of filling, burning, and clearing may be carried on simultaneously in different sections. Each section can be fired separately from above, and the kiln is, therefore, never allowed to go out, the flame from one starting the next when required. This method effects a considerable saving in fuel, the heat being almost entirely given up before reaching the chimney. A very interesting part of the visit was that to the terra-cotta workshops, where a variety of artistic work was seen in different stages of completion. Each piece is made in an alabaster mould, built in sections, so that it can be easily removed when the cast is finished. These casts having received a few finishing touches, are afterwards dried and burnt. At the close of the meeting a light luncheon, generously provided by Mr. H. R. Vaughan, was partaken of, and on the motion of Mr. Thos. L. Moore, seconded by Mr. Richard Allen, a hearty vote of thanks was accorded to Mr. Vaughan for his kindness. The motion was carried by acclamation, and conveyed to Mr. Vaughan by the President (Mr. Geo. Elliott), and he suitably replied.—*Belfast News Letter.*

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STEAM POWER MACHINES—

New Improved Brickmaking Machine, for steam power, with Vertical Pugmill, of strong cast-iron sectional plates (can be made of steel plates if desired at a slight extra cost), complete, with expression rolls, lubricating brick die, cutting-off table, &c. This machine has double purchase spur and bevel gearing, and the expression rolls are driven direct from main shaft by spur gearing. It is mounted on strong cast-iron bed plate, and is fitted with my Improved Cast Steel Knives, and improved adjustable top thrust bracket.

Clayton, Howlett & Co.'s Horizontal Machine, with overhead rolls, Murray's table, thoroughly overhauled. Capacity 12/15,000 per day.

Bawdons' Brick Pugging and Moulding Machine, nearly new.

No. 7a Brickmaking Machine by Whitehead, with rolls overhead, and hoisting gear, cutting-off tables, &c., complete.

Two No. 7 Horizontal Machines by Whitehead, with crushing rolls, dies and cutting-off tables complete.

Large Screw Quarry Press by Pullan and Mann.

One nearly new powerful Machine by Sampson & Sons, two pairs of top rolls, one plain and the other corrugated, all complete for an output of 20/25,000 per day.

Two Gill's Patent Presses, one with engine.

"Eclipse All" Brickmaking Machine by Scholefield, with press and mixer complete.

Portable Brickmaking Machine by Bedford Iron Co., horizontal pug, mouthpiece, die, and cutting-off table, complete.

Set Crushing Rollers, perfect and self-contained, mounted on good strong foundations for steam or water power, rolls 24 in. × 16¼ in.

Set Ditto Ditto, rolls, 34 in. × 18¾ in.

Set Expression Rolls, gearing, housings, mouthpiece, &c., all complete.

Vertical Pug Mill, all iron, for steam power.

Several sets Hoisting Gear.

HAND AND ANIMAL POWER MACHINES—

No. 4 Hand Power Pipe and Tile Machine, by Bedford Iron Co. complete, with cutting-off table.

No. 3, Ditto ditto, by Page of Bedford.

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Several Vertical Pug Mills for animal power.

Brickmaking Machine, consisting of vertical pugmill, die, and cutting-off table, for animal power.

Lever Brick Press, by Clayton, Howlett & Co.

CLAY PANS, &c.—

5 ft. 6 in. Under-driven Pan, rolls 2 ft. 6 in. diam., by Mason Bros.

7 ft. 6 in. Under-driven Pan, by Mason Bros., all complete, new.

Second-hand 8 ft. Over-driven Perforated Pan, rolls 4 ft. by 15 in., all complete, W.I. rim.

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100 yds. Portable Railway, 2 ft. g., consisting of steel flanged rails, 14 lbs. per yard, and steel sleepers with clips, pressed out to receive rails, and made expressly for this section of rail.

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This Kiln is superior to all others for Burning High-class Facings and Moulded Bricks, Terra-Cotta, Chimney Pots, Tiles, Quarries and other articles.

PRACTICAL MEN state it to be the only Continuous Kiln which has been known to turn out High-class Goods, superior to any Down-draught Kiln (see Testimonial below).

THE UNRIVALLED ADVANTAGES OF THIS KILN

Transcend all others for the thorough drying of all goods whereby the finest colour is ensured. Green Bricks can be set as soon as they are hard enough for piling, and will come out of the kiln (after being treated with the hot-air drying system) of a beautiful tint, without any stain, and ***absolutely free from Loss or Waste.***

The outlet for all steam and moisture from each chamber excels any kiln that has ever been erected on the continuous system. In all other continuous kilns the steam has to travel the whole length of chamber (through all the goods) before it can get away; this is entirely overcome in the "MANCHESTER" KILN.

TESTIMONIAL.

THE REDHILL BANK BRICKWORKS, ROCESTER, STAFFS.,
November 4th, 1898.

DEAR SIRS,—We have now burned round your new continuous kiln for the first time, and are pleased to find the bricks come out a deal better in colour (both corners and facings) than those burnt in the ordinary down-draught ovens. I believe when the kiln gets properly dry the saving in slack alone will be a considerable item, and the bricks, being so much better in colour, will command a better sale.

Yours truly,
A. HEWINS.

Messrs. DEAN & HETHERINGTON, WALL GRANGE, LONGSDON, STAFFS.

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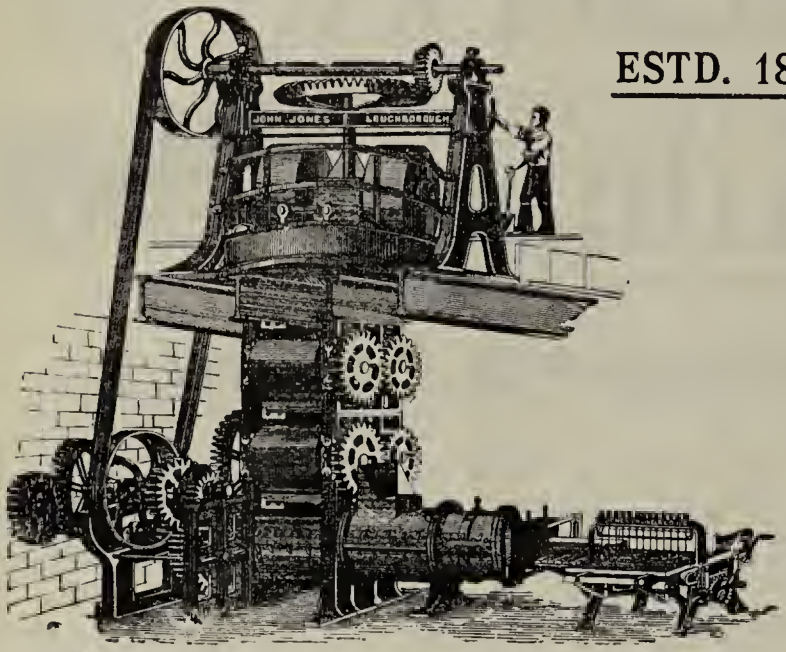

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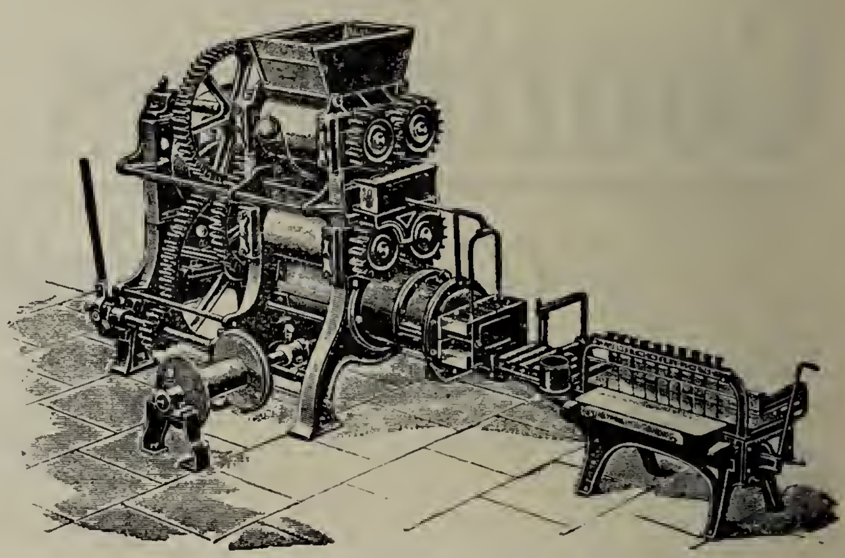

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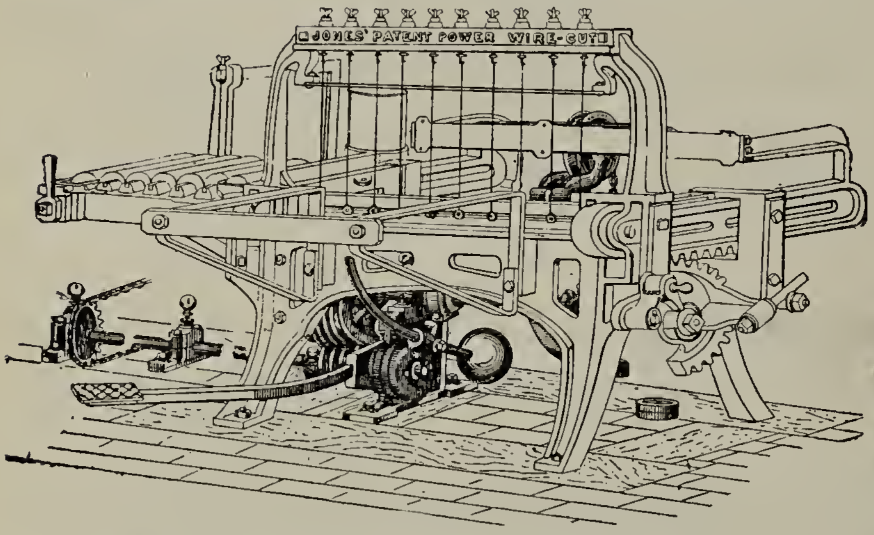

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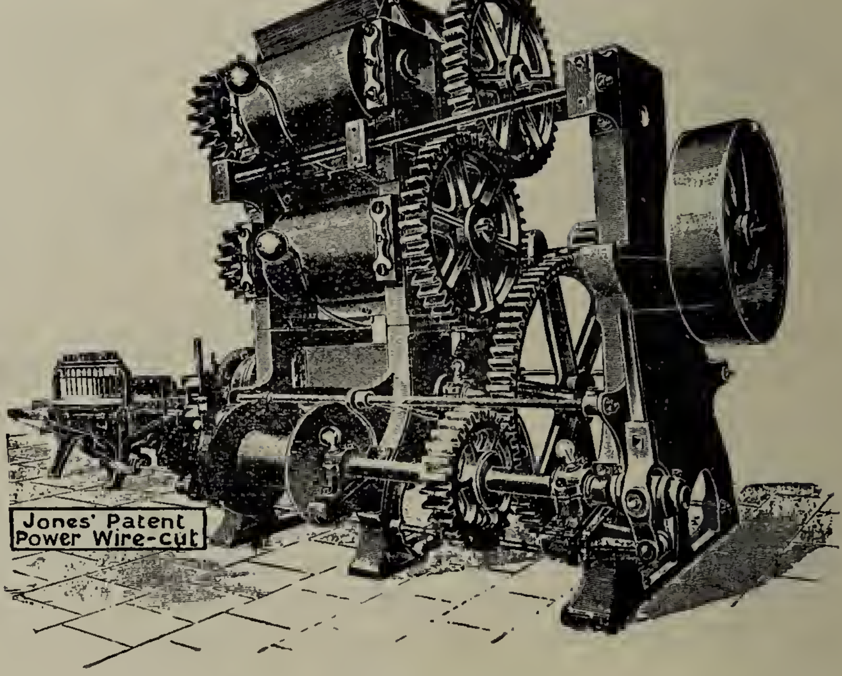
Our Patent Power Attachment can be applied to your present Wire-cut, and saves a man at the handle end



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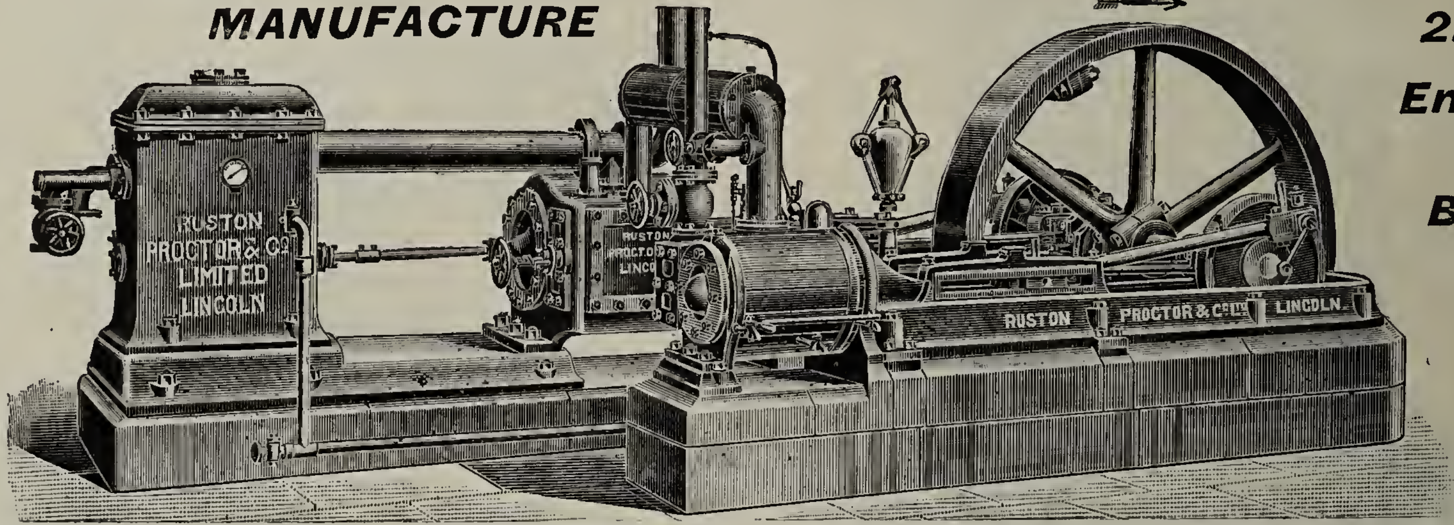

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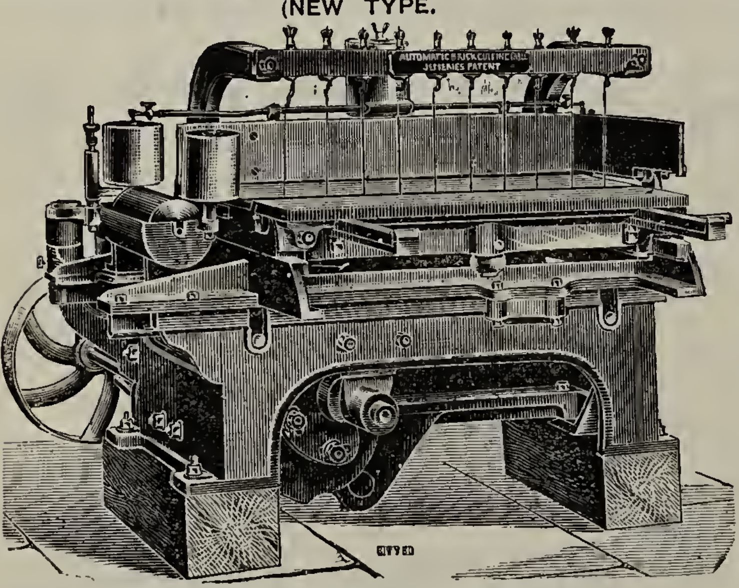

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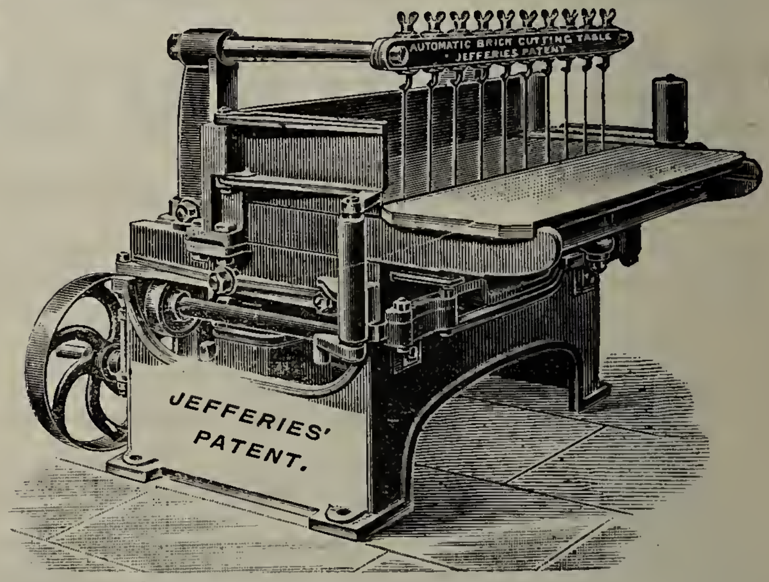

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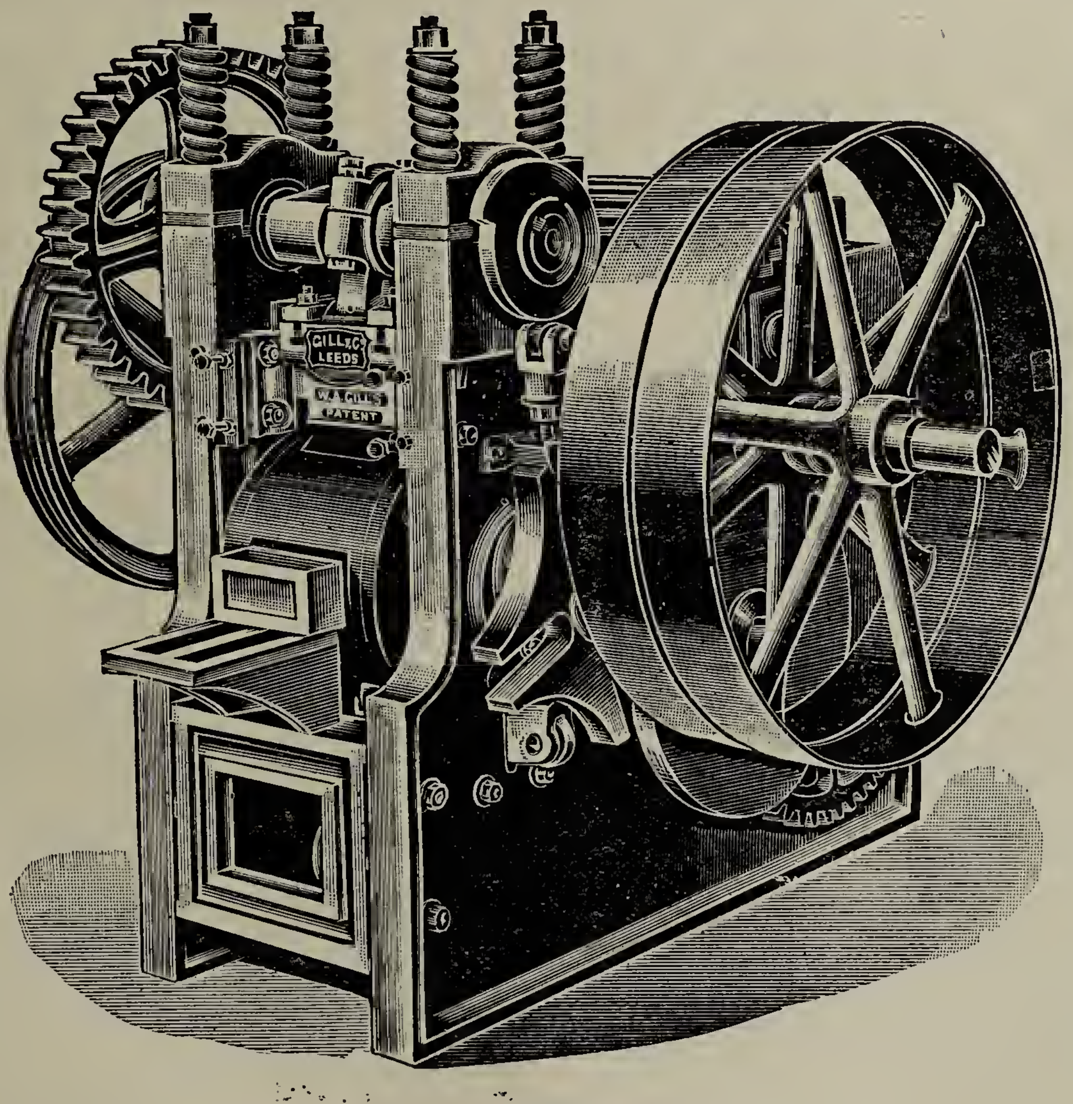
For Red, Fire and Glazed Bricks.



This Machine, as illustrated, makes a stiff plastic finished brick, at the rate of 10,000 bricks per day of ten hours, from clay ground through a perforated pan or horizontal crushing rollers. There are no screws or rammers used to feed moulds in this machine as in other machines, the clay passes through a pair of fluted expressing rollers and die into moulds in revolving cylinder, thereby making a solid brick equal throughout. ***It has less wear and tear, takes less power, and makes a sounder brick than any other finished brick machine in the market.*** When the feeding rollers are working the cylinder is stationary, and when cylinder is revolving rollers are stationary, thereby causing no friction on cylinder. Bricks made by this machine are free from lamination, which is caused by screws used for feeding the cylinder or moulds in other plastic machines. ***The machine can be fitted with rollers to feed horizontal, as shown, or vertical into sliding mould or revolving cylinders.***

REVOLUTION IN BRICK MACHINERY.

LAMINATION ENTIRELY AVOIDED, HOWEVER STRONG THE CLAY MAY BE.

THIS MACHINE SHOULD BE SEEN BY ALL INTENDING PURCHASERS BEFORE PLACING THEIR ORDERS.

PRICE ON APPLICATION.

NEW COMPANIES.

Dunn, Bennett & Co.—Capital £35,000, in £1 shares, to manufacture earthenware, bricks, tiles, pipes, &c.

Madeley Heath Brick and Tile Company.—Capital £5,000, in £1 shares, to carry on the business of brick and tile manufacturers.

Hobson and Co., Ltd.—Capital £1,000, in £1 shares. To adopt an agreement with H. and W. Hobson, and to carry on the business of brick, tile, terra-cotta and earthenware manufacturers.

Mickley Coal Company, Limited, Newcastle-on-Tyne.—Capital £162,000, in £100 shares. To acquire the Mickley Colliery, and to carry on the business of brick manufacturers, &c.

Midland Brick and Terra-cotta Company.—To acquire and carry on the business of a company of the same name carrying on business at Coalville, Leicestershire. Capital £5,000, in £1 shares.

Grayson's Double Dovetail Fixing Brick Syndicate.—To acquire upon the terms of a certain agreement the existing patent of Alfred Grayson, of Westfield House, Barnes, Surrey, and to develop and work the same. Capital £1,000, in £5 shares.

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Arvon Brick and Tile Company, Limited.—Capital £16,000, in £1 shares. To acquire and carry on the businesses carried on as the Public Brick Company and the Seiont Brick Company at Carnarvon, and to adopt an agreement with U. Bramley, E. Pierce, and R. Evans. Registered without articles of association.

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Ibo and Nyassa Corporation, Limited.—Capital £525,000, in £1 shares, 25,000 of which are founders'. To trade as general merchants, brickmakers, builders and contractors, &c. The number of directors is to be not less than three nor more than seven; the subscribers are to appoint the first. Qualification, £1,000. Remuneration, £250 each per annum and a share in the profits.

John Nicholls & Co., Limited.—Capital £8,000, in £1 shares, to acquire and carry on the business of china clay merchants carried on by J. Nicholls, M. Silverlock, J. Nicholls, H. Nicholls, Emile Nicholls, and Elfrida Nicholls at Galva, Plympton, Devon. The first directors—to number not less than two nor more than five—are J. Nicholls and L. J. N. Silverlock. Qualification, one share. Remuneration as the company may decide.

Bagworth Brick Company, Limited.—Capital £10,000, in £1 shares. To lease from the Countess of Warwick certain lands at Bagworth, Leicestershire, and to carry on the business of brick, tile, terra-cotta, and earthenware manufacturers, &c. The first directors—to number not less than three nor more than five—are H. S Gee, J. Roberts, and J. F. Neal. Qualification, £100. Remuneration, £100 each per annum.

Arnewood Estates and Brick Company, Limited.—Capital £20,000, in £10 shares. To acquire, develop, turn to account, and deal with the Arnewood Estate at New Milton, Hants, and to adopt an agreement with G. Davis and A. E. Williams. The first directors—to number not less than three nor more than seven—are to be nominated by the subscribers. Qualification, £50. Remuneration as the company may decide.

Richard Bennett & Co., Limited.—Capital £12,000, in £10 shares, to acquire and carry on the business of brick, tile, pottery, and earthenware manufacturers and merchants, now carried on by W. Sayer, at Slack Lane, and Thorncliff, Derby, as "Richard Bennett & Co." The number of directors is to be not less than two, nor more than five; the first are Miss E. Bennett, W. Sayer, and R. C. S. Bennett; qualification, £500. Registered office, Slack Lane, Derby.

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Advertisements inserted under this heading at a charge of One Penny *per word. Minimum charge,* 2s.

WANTED SMALL BRICKYARD in working order. Near the railway.—Address with full particulars, Box 500, Office of the *Clayworker.*

FOR SALE, a newly established BRICKWORKS on the Carnarvonshire Coast. Clay bed 90 feet deep at least, quality excellent for engineer's goods, etc. Large demand at Pwllheli, Bangor, Dublin, etc. Low rent.—Apply to Mr. J. T. Howells, Pwllheli.

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To Firebrick Manufacturers and Fireclay Users.

TO BE LET on LEASE or SOLD, LAND CONTAINING FIRECLAY possessing the highest refractory qualities and analyzing up to 93 per cent. of Silica.

In addition to the Fireclay there is a Surface Clay from which it is considered first-class Red Facing Bricks can be made and it is believed that by proper treatment a Blue Brick can be made.

There is also Clay and Stone suitable for the manufacture of Portland Cement. The Clay enamels splendidly.

The Property is situated at what might be called the gateway of Ireland, being alongside the sea, and within 7 miles of the City of Dublin. There is a large and increasing demand in Ireland for all kinds of Enamel and Fireclay goods which have hitherto been imported from England and Scotland.

The price of ordinary Firebricks in Dublin at present is from £3 per Thousand upwards, and the cost of manufacture of these from the Clay in question and delivered in Dublin is estimated not to exceed 22s. per Thousand.

Altogether this is an opportunity of acquiring a Property of the kind which is not met with more than once in a lifetime.

For further particulars apply to R. A. Rossborough, 17, Prince Patrick Terrace, N. C. Road, Dublin.

FOR SALE.

THE BUILDING, FIXED and MOVABLE PLANT belonging to THE CLELAND POTTERY CO., in Liquidation. Situated midway between Edinburgh and Glasgow, with Siding to Caledonian Railway.

Works are in good repair, and have been well equipped with Modern Machinery recently. There are four Kilns, with relative Plant.

Works may be readily adapted to many industries requiring cheap fuel, fireclay, &c.

Stock-in-Trade may be sold separately. Ground extends to 10,225 square yards. Feu-duty, £10. Price very moderate.

Apply to John Mann & Son, C.A., 137, West George Street, Glasgow.

10th May, 1899.

ESTABLISHED HIGH CLASS BRICKFIELD, situate near Bracknell and Reading, S. W. Railway, with sidings up to Kilns. New Kilns were completed six months ago. There are 40 acres of Freehold Land with a depth of about 20 feet of Clay. Over 50 acres of Leasehold, Royalty 1s. 9d. per thousand on Leasehold. This land is optional to the purchaser. Total cost of Bricks, including Royalties and all charges, 20s. 9d. per thousand; price of Bricks at works from 35s. to 40s. per thousand. Output at present 11,000,000 per ann. It is estimated that for 100 years the output could be 20,000,000 per ann. Profits for last six months £2,600 (certified by accountants). Price £25,000. The Clay raised and weathered for this season up to 11,000,000 Bricks, to be taken by valuation or at cost price.—Application to "Architect," c/o *British Clayworker*, 43, Essex Street, W.C.

PROPERTIES WANTED AND FOR SALE.—*Continued.*

TO BRICKMAKERS, CONTRACTORS, and others. Large quantity of LONDON CLAY for disposal, suitable for Brickmaking and for puddling purposes.—Address to W. B., c/o *British Clayworker* Office, 43, Essex Street, Strand, W.C.

BRICKMAKING LAND at South Bank, near Middlesboro', for brickmaking. Forty acres of best quality CLAY, 30 ft. seam, To be Let on Royalty.—Further particulars from N. R. Fleming, Estate Office, Normanby, near Middlesboro'.

To be Sold by Private Contract.

ALL that valuable Freehold WHITE BRICK & DRAIN PIPE WORKS, situate at Bardney, in the County of Lincoln.

The Property comprises about 9 Acres of Land (with one of the finest beds of clay in Lincolnshire), Plant, Machinery, &c., and has been worked successfully for thirty years by the present proprietor and vendor.

There is a convenient siding in connection with the Great Northern and the Louth and Lincoln Railways.

Ample room for extension or for the introduction of any other business.

The new free bridge over the river Witham at Bardney has opened out an extensive area of land under cultivation.

If desired a commodious Freehold Residence adjoining the premises will be included in the Sale.

Part of the purchase-money may remain on the property at a low rate of interest. Splendid opportunity either for a syndicate or otherwise.—Apply to Geo. Hall, proprietor.

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Advertisements inserted under this heading at a charge of One Penny *per word. Minimum charge,* 2s.

WANTED, Strong Clay GRINDING PAN ROLLERS, not to be less than 1 ton each, with movable bottom plates, in thorough order.—Morgan, Towyn, N.W.

WANTED, delivered at Arlesey Station, G. N. Railway, a JOHNSON'S STIFF PLASTIC BRICK MACHINE and CLAY WORKER.—Quote the Soothill Wood Colliery Co., Batley, Yorkshire.

WANTED, EDDINGTON BRICKMAKING MACHINE in Good Order.—C. Dudley, Woburn Sands.

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FOR SALE, ONE CORNISH BOILER, 26ft. by 6ft.; ONE LANCASHIRE BOILER, 26ft. by 7ft.; working at 45lb. pressure.—Apply Rosemary, Tileries, Cannock, Staffordshire.

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MACHINERY, &c.—*Continued.*

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One 24 by 36in. Horizontal Expansion Steam Engine, heavy fly wheel, &c.

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One 12½ by 24in. Horizontal Tangy's Type Expansion Steam Engine, heavy fly wheel, &c.

One 8 by 18in. New Tangy's Type Expansion Steam Engine, turned fly wheel, &c.

One 18¾ by 20in. Massive Inverted High Speed Engine, 10ft. fly wheel, &c.

One 11 and 20in. by 24in. Compound Condensing Tandem Engine.
One 12½ ,, 22in. ,, 26in. ,, ,, ,, ,,
Two 20 by 6 Lancashire Steam Boilers, all mountings, &c.
One 24 ,, 7 ,, ,, ,, ,,
One 18 ,, 6 Galloway ,, ,, ,,

For full Particulars & Prices address—J. Light, Wolverhampton.

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FOR SALE, a superior massive 30 in. by 48 in. HORIZONTAL EXPANSIVE STEAM ENGINE, with heavy Fly Wheel and appliances; a grand engine for large brickworks.—J. Light, Wolverhampton.

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PORTABLE or TRACTION ENGINES, and TRACTION WAGONS, all Sizes, FOR SALE, cash or reasonable terms. Horizontal Engines, Cornish, Vertical, and Multitubular Boilers, Chaff Cutters, Stone Breakers, Mortar Mills, Saw Benches, Ploughing Engines and Tackle, Thrashing Machines. Any good Engines or Machinery would be taken in part payment. —Write, Williams, 38, Dawes Road, Fulham, London, S.W.

PLASTIC BRICK MACHINE FOR SALE, Cheap. Also a 9-FOOT PERFORATED PAN, and a TRACTION ENGINE.—Armstrong's, Northampton.

LARGEST and MOST VARIED STOCK of MACHINERY in the KINGDOM at my Newport and Gloucester Works respectively:—

48 PORTABLE ENGINES, from 2½ h.p. to 30 h.p.
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15 SAW BENCHES, for various sizes circular saws.
7 STONE BREAKERS.
72 PUMPS, of various kinds and sizes, for land and marine purposes.

Will let on hire or hire-purchase, on reasonable terms.

Send for copy of **Phillips' Monthly Machinery Register,** 6d. per copy; subscription, 6s. per annum.

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Telegrams, "Machinery, Newport, Mon." Nat. Telephone No. 18.

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Powerful pair H.P. Horizontal Engines, 36in. by 5ft.; cut-off; modern; by Hicks.

Massive Compound Engine, 21in. and 30in. cylinders. 3ft. 6in. stroke, 300 I.H.P.

Capital 36in. by 36in. very modern Horizontal Engine, by Black, Hawthorn.

Corliss Engine, by Hick Hargreaves, 24in. by 4ft., Corliss Valves, etc.; equal to new.

12in. and 21in. Compound, modern.

Also capital selection of Horizontal Engines, 24, 22, 21, 20, 18, 16, 15, 14, 12 and 10in. cylinders.

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BOILERS, 30ft. by 8ft. for 80lbs., and all fittings.

Do., 30ft. by 7ft. 6in., for 80lbs.

Three do., 30ft. by 7ft. for 60lbs.

Also many others, and a large stock of Cornish Boilers.

Winding and Hauling Engines.

Locomotives, Traction Engines, Cranes, and an

Immense Stock of Machine Tools.

The above are in stock at Bolton.

Inspection Invited.

THOMAS MITCHELL & SONS, LTD., Derby Street, Bolton

Catalogue on application.

Best Stock of Machinery anywhere.

IT IS WORTH YOUR WHILE TO BUY DIRECT.—THE RELIANCE LUBRICATING OIL COMPANY SUPPLY on APPROVAL "Reliance" High-class **NON-CORROSIVE LUBRICANTS**, which, through their superiority, have the largest sale in the World. Engine, Cylinder and Machinery Oils. 11¼d.; Spindle Oil, 8¼d.; Loom Oil, 10½d.; Extra Special Cylinder Oil, 1s. 4d.; Extra Special Engine Oil, 1s. 4d.; Gas Engine and Dynamo Oils, 1s. 6d. per gallon; Light Machine Oil, 10¼d.; barrels free and carriage paid. Brick Oil, 4d. per gallon.

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PAIR EXCELLENT 21-INCH HORIZONTAL ENGINES, 48in. stroke, suited to work at high pressure. HAULING ENGINE, 16in. cylinder, 3ft. stroke, drum 5ft. diameter. 20-INCH HORIZONTAL ENGINE, 36in. stroke, bed 17ft. by 3ft. 12-H.P. COMPOUND PORTABLE ENGINE, 7in. and 12½in. cylinders, 12in. stroke, new firebox and tubes. 6, 7, and 8-H.P. PORTABLE ENGINES, fitted with new fireboxes and thoroughly overhauled. 2 LANCASHIRE BOILERS, 30ft. by 6ft., will insure for 70lbs. working pressure (insurance report). 2 LANCASHIRE BOILERS, 30ft. by 7ft., for 50lbs., with mechanical stokers. 4 STEEL CORNISH BOILERS, 30ft. by 7ft. with fittings for 70lbs. working pressure. 3-TON STEAM DERRICK CRANE, jib 47ft. long (by Dunlop, Bell and Co.), newly overhauled.

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Filtered Brick Oil	3½d.	,,
Tram Grease	5s.	per cwt.
Cotton Waste	18s.	,,
Tallow, English P.Y.C.	23s.	,,

Apply to the Tyne Oleine Co., Guildhall Chambers, Newcastle-on-Tyne.

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MY EXTENSIVE CONNECTION and EXPERIENCE enable me to supply you with just what you want of the **Best Quality**, and at the **Lowest Prices Possible** for the value, from a small piece of **Fustian** to a **Complete Outfit** of **New Plant**. When ordering **GENERAL STORES** do not be deluded into buying what is described just as good for less money. To prevent stoppages and maintain your output you **MUST HAVE THE BEST PROCURABLE OF EVERYTHING YOU USE. THIS IS MY SPECIALITY**, and you will benefit yourselves as well as myself in sending your orders.

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Estimates given on receipt of specification.

Appended are three recent testimonials:—

HENDEN BRICKWORKS, *April 26th, 1898.*
DEAR SIR,—The 300 Hack Caps you have sent me are the best I ever had. Yours truly, C. COOPER.

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DEAR SIR,—I received the Pallet Boards safe yesterday, but really forgot to write to you last night. I am very pleased with the wood for covers. Yours truly, W. WARREN.

BEACH FARM ROAD, SOUTHSEA, *February 7th, 1898.*
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For Sample Hack Cap forward 1/- in stamps.

Write for Prices and Particulars to H. BLACKNELL, Postal Box and Hack Cap Manufacturer, FLEET, HANTS.
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MISCELLANEOUS.—*Continued.*

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TO BRICKMAKERS, Enamel-Users, Inventors, Patentees, and others to whom it may be of benefit, a PRACTICAL ENGINEER and ELECTRICIAN who is thoroughly conversant with the successful treatment of all kinds of Clays, Shale, &c., has at his command a Model Factory fitted with all appliances, blasting and glazing furnaces, kilns and laboratory, and is prepared to carry out Experiments of all kinds appertaining to the above with the view of turning to account refractory clays, &c., and perfecting patents. All kinds of glazes, enamels for pottery, or bricks generally would receive successful treatment. Correspondence invited, and all communications will be treated with strict confidence.—Expert, c/o *British Clayworker*, 43, Essex Street, Strand.

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JAMES PRINCE, Brickworks Engineer, 21, Addison Street, Blackburn, is prepared to FURNISH PLANS and SUPERINTEND the ERECTION of NEWCASTLE KILNS, including his latest improvements, or the Alteration of existing Kilns upon reasonable terms.

MR. H. R. VAUGHAN, Brickworks' Engineer, Patentee of Improved Steam Drying Sheds, The X.L. All Continuous Burning Kiln, Brick Dies, &c., having had 25 years' practical experience in Machine Brickmaking, is open to ADVISE on most suitable Machinery and Plant, and to Prepare Plans for the best modern and complete Plants of any size, adapted for all kinds of Clay.—Address, H. R. Vaughan, Lagan Vale Brickworks, Belfast.

THOMAS SIMMONDS, KILN BUILDER, &c., gives ESTIMATES for the Building of Up and Down-draught, Round or Square Kilns, for the Burning of Bricks, Pipes, Terra-cotta, Bristol Ware, &c. Established over 50 years.—THOMAS SIMMONDS, 25, Vauxhall Walk, Lambeth, London.

Important to Brick Manufacturers and Contractors.

JAMES SHENTON, C.E., M.I.M.E., Consulting Engineer, West Bromwich. References: Messrs. Hamblett, Wood and Ivery, Tibbington Brick Co.; P. and S. Wood, B. Blades, S. Barnett, S. Sadler, Highbrooms, Tunbridge Wells; J. W. Courtis, Cardiff; and many others, too numerous to mention. Twenty years practical experience. Plans and Specifications prepared, the erection of new plants superintended, and existing ones remodelled. Applications to the above address promptly attended to.

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WANTED at ONCE, as PERMANENT WORKING MANAGER for Sussex Brickworks, energetic and reliable Man, 30 to 35, with thorough practical knowledge of Brickmaking Machinery, Wire-cuts, and all branches of Brick and Tile Making.—Apply, stating wages, references, &c., to "Sussex," 43, Essex Street, Strand, W.C.

WANTED a Junior TERRA-COTTA DRAUGHTSMAN at once.—Apply, Commondale Brick and Pipe Co., Commondale, Grosmont.

WANTED, Experienced YARD FOREMAN for Red and Blue Works. Good references indispensable.—Apply, Scottish Terra-Cotta Co., Braidwood, Carluke, N.B.

BURNER WANTED, thoroughly used to Sercombe's Patent Kiln. State wages and experience.—Address, "Coal," c/o *British Clayworker*, 43, Essex Street, Strand.

SETTER WANTED, thoroughly used to Sercombe's Patent Kiln. State wages and experience.—Address "Coal," c/o *British Clayworker*, 43, Essex Street, Strand.

BRICKLAYER WANTED, accustomed to building Hoffmann kilns; also Good MANAGER for big job, must thoroughly understand small property.—Office, 126, Stephendale Road, Fulham, London.

SITUATIONS WANTED.

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WANTED, RE-ENGAGEMENT as MANAGER of EXPORT TRADE. Thorough experience exporting Fire and Silica Brick to all markets of the world. At present conducting large brick export business.—Address "Conduct," 43, Essex Street, Strand, London, W.C.

WANTED, by a thoroughly practical Brickmaking Engineer an appointment as MANAGER; very large experience in Semi-dry, Semi-plastic, and Wire-cuts; well up in the most modern systems; energetic and good organiser; experienced in Laying out New Works and Building Kilns for all purposes.—"System," 43, Essex Street, Strand, London, W.C.

ANTI-SCUM Burnt-in BRICK REDDING.	For Finials and Terra-Cotta. *Samples, etc., of* W. J. FURNIVAL, Clay Merchant, STONE, STAFFS.
ANTI-CRAZE for BODIES & GLAZES.	Samples and particulars on application to W. J. FURNIVAL, Clay Merchant, STONE, STAFFS.
RESEARCHES on LEADLESS GLAZES.	Price £5/5/0. Synopsis free. W. J. FURNIVAL, STONE, STAFFORDSHIRE.

SITUATIONS WANTED.—*Continued.*

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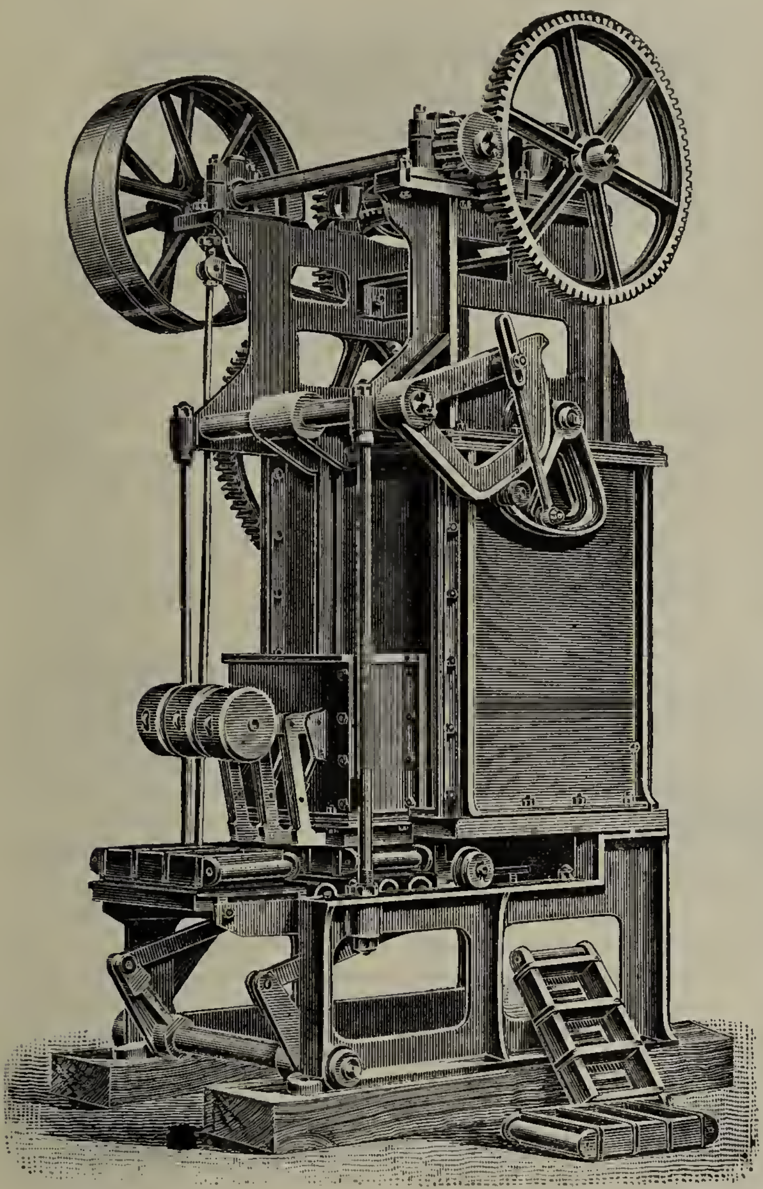

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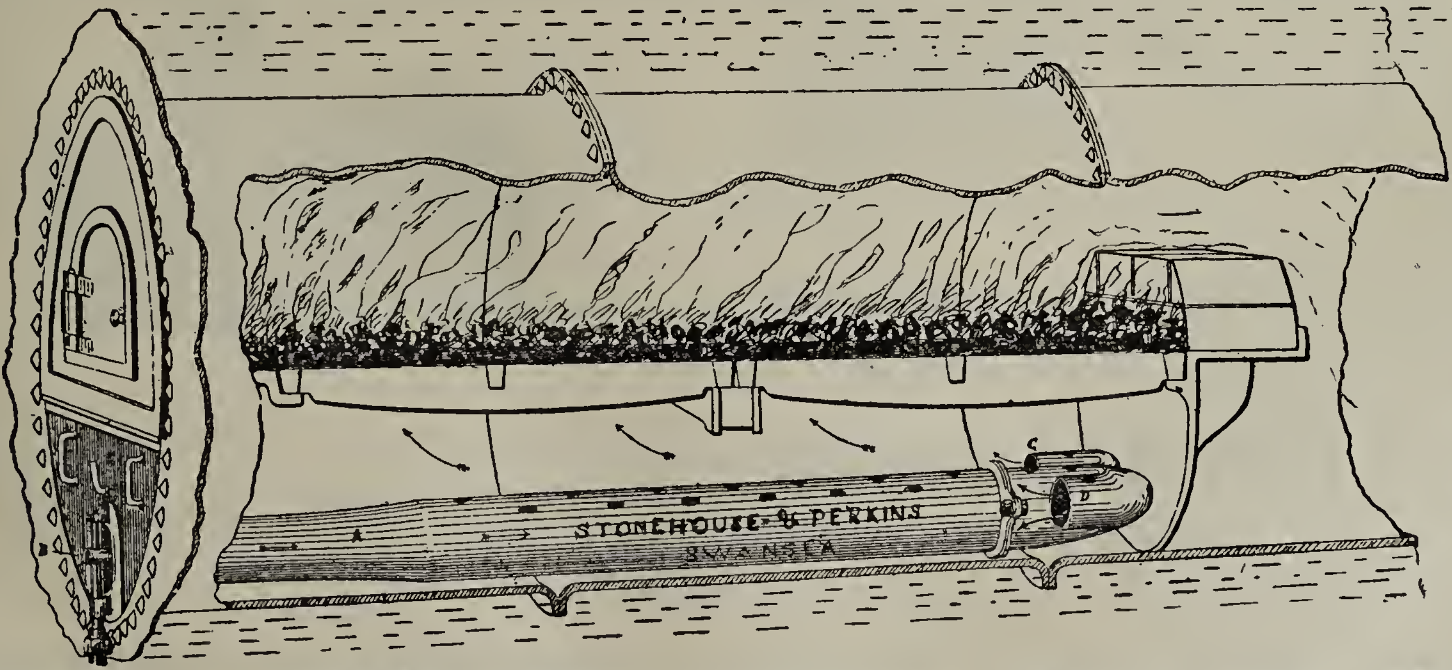

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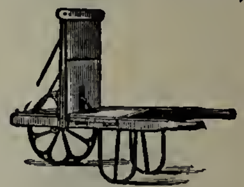

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THE BRITISH CLAYWORKER.

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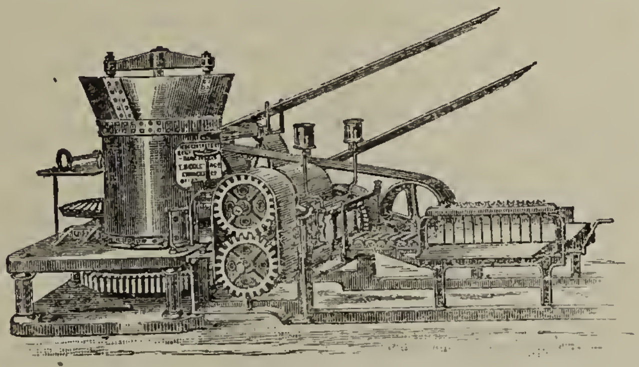

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BY THE WAY.

We have one straight question this month to put to every clayworker throughout the country, and that is, "Are you insured so far as your liability as an employer goes in the British Clayworkers' Mutual Insurance Corporation?" And, if not, have you any valid reason for declining? You must remember that this Company was not floated as a money-making concern; it was started at some monetary risk, and entirely in your interest; it was it and it alone that secured you the privilege of a low premium, and you must, of all things, remember that it would be a foolish policy on your part to ignore this Company in favour of other companies that may quote you a cheaper rate, when the object of these companies is admittedly to wipe us out of existence. Do you wish to assist other offices to revert to the high rates quoted before we came into existence? There is such a thing as being "penny wise and pound foolish," but we have a sufficient knowledge of the trade to know that it is not a short-sighted body of men, and is certainly able to look a little farther ahead than the end of its nose. A question of this kind ought never to be brought to the level of pounds, shillings and pence; it is a question of the trade hanging together for their common protection. If they are false to themselves now, is there anyone who will trouble themselves as to what happens to them in the future?

* * *

The Workmen's Compensation Act finds increasing work for lawyers, and the more one reads its provisions the more one marvels at the ambiguity in which it is enveloped. Already nearly twenty appeals have been entered for hearing, and it is small wonder if, with judges at general disagreement as to the intentions of the legislature, a layman should utterly fail in his attempts to interpret it. The opinion of a deputy judge upon the provisions of the Act is hardly a compliment to its sponsors. In trying a case recently he said: "The Act was an extraordinary tangle of legislation. The statute seemed to have been drawn by a person who had strayed into the land of topsy-turveydom, and there acted upon his recollection of the great composition, 'The House that Jack Built,' but also with the disadvantage of not knowing what he meant. The draughtsman of the Act had left the judges to guess at what was meant."

* * *

The astonishing number of new companies in the brick trade is an indication that activity in clayworking is in no danger of falling away just yet. At the same time it does not mean prosperity for all the new ventures, for many of them are merely taking advantage of booming times to work off properties to advantage, while others are hoping to get a share in a business which cannot at present supply the demand. The remark made by an architect in our last issue, that more brick-yards *must* be opened up to meet the demand, may be all right from his point of view, but one cannot make good bricks in a hurry, and it is not everybody that can sell them when they are made. By the time that many of our new companies have got first-class bricks to sell there may be a falling off in the demand, and some of our over-capitalised companies will find that brickmaking is not always a profitable occupation to everybody.

The Clayworkers' visit to Germany was, we hear, a very pronounced success, and a short account of the outing is given on another page. If anything, it was a little too ambitious—an attempt to see a great deal in a short space of time. But there were very few, if any, grumblers, and this is after all the best index to the popularity of a trip.

* * *

By the way, it will be difficult to arrange a trip that will not in any way fall below that of its predecessors in popularity, and each year makes the task more arduous. Some suggestions as to desirable places would be welcome.

* * *

We hear that Messrs. Thos. Middleton & Co., of Southwark, have secured the contract from the Egyptian War Office for the supply of all the brick, pipe and tile-making machinery necessary for the manufacture of bricks and tiles at the Gordon College, Khartoum. The first shipment of the plant is leaving London this week. We hope to say something upon brick-making at Khartoum in a subsequent issue.

* * *

We are informed that the Lord Chancellor, in consideration of the distinguished services Mr. Courtis recently rendered to his "party" in Berlin, has gazetted him a J.P. for Cardiff. Mr. Courtis is already a Councillor in the Council of the Borough, and this further honour is, we hope, only a stepping stone to higher things. We trust that when he is Lord Mayor Courtis he will still find time to accompany his brother chips on their annual, and to enliven them by his wise magisterial *obiter dicta*. We add our congratulations.

* * *

Those who made the journey to Copenhagen last year will learn with much regret of the sudden death of Mr. F. L. Smidth, head of the firm of engineers who so genially entertained us on our visit to Denmark. We had the pleasure of meeting Mr. Smidth early this year in Berlin, at the conference of German clayworkers, and he then appeared in the best of health. His death occurred on the 2nd inst. after a very short illness. Mr. Smidth was founder of the firm which bears his name—a man of great power and energy and of charming personality. His relationship to his co-workers, Messrs. Alexander Foss and Poul Larsen, is best expressed in a letter we have received from them, in which they refer to their late chief as "our dearly beloved senior partner."

* * *

One can hardly be surprised that in a recent case brought under the Factory Acts, the defendant should urge that he tried to the best of his ability to fill up the "innumerable returns" asked for by the Government. One has now to make returns and notifications for almost everything, and it is as well that the duties imposed upon employers should be well understood. Only last week a Scotch firm were fined heavily for contravening the Factory Acts in failing to notify an accident to the inspector and certifying surgeon for the district, and entering the same in the register.

* * *

One of our readers makes the suggestion that the series of articles now appearing on Book-keeping for Brickmakers, should be put into book form and sold to the trade. If there is sufficient demand for a set of books, we shall be glad to put them in hand forthwith.

THE BRICK-EARTHS OF GREAT BRITAIN.—XXIII.

CAMBRIDGE AND DISTRICT—*Continued.*

THE map (p. 38 *ante*) does not give any account of the superficial (drift) deposits beyond shewing the extent of alluvium. So, before passing on, it may be remarked that the solid beds hereabouts, especially to the west and south-west of Cambridge, are much covered over by thick drift deposits. Boulder clay is well developed to the west of Coton, as at Hardwick, Bourn, &c., and indeed the surveyors found it difficult to satisfactorily determine the boundary line of the solid deposits in all that part of Cambridgeshire. The influence of the University has, naturally, been felt all over the district, and the Woodwardian professor has imbued his students with such enthusiasm, that every inch of the ground has been examined times without number. Unfortunately for us this careful work is of more philosophic than economic interest; and it may well be doubted whether even the professor himself (in spite of his connection with the Geological Survey years ago) can tell a good brick-clay from a bad one. Never mind, everyone who has ever come under his influence adores Professor McKenny Hughes, and it is not his fault that so few geologists, striking out a line of their own, think that the uses of the science will yet be taught at St. John's. That will come right enough when the practical uses of geology are understood by geologists (apart from petrologists and palæontologists) in the same way as the uses of physics are by physicists, chemistry is by chemists, and forestry by botanists.

FIG. 4.

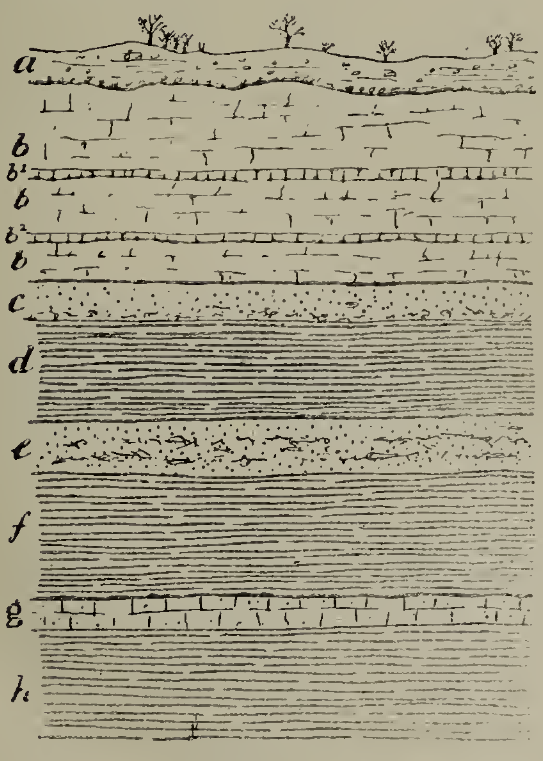

FIG. 4.—GENERALISED SECTION OF FORMATIONS IN THE CAMBRIDGE DISTRICT.

The geological formations round Cambridge are generalised in fig. 4. The uppermost bed (*a*) is intended to represent the various superficial beds, including fresh-water and marine gravels, boulder clay, and gravels beneath the boulder clay. None of these are suitable for brickmaking—at least nobody would, we imagine, think of using them where so much Gault clay was near.

Then comes (*b*), the chalk with two hard stone bands in it. Underneath the chalk marl we find the so-called Cambridge Greensand (*c*) full of phosphatic nodules—of interest to the agriculturist but not to the brickmaker. *The* formation is (*d*) Gault already described. Below this is the Lower Greensand (*e*), see observations on Ely district. The Kimeridge Clay (*f*) outcrops just outside our map to the north-west. Calcareous grit (*g*) is in the same neighbourhood. The lowest bed shown in the section is the Oxford Clay which is here about 700 feet in thickness.

The "solid" deposits to the west of Cambridge are buried under such a thick covering of Boulder clay and plateau gravel that their precise boundaries have never been satisfactorily ascertained. Particularly is that the case in the neighbourhood of Hardwick, Kingston, Bourne, Childerley and Knapwell. This Boulder clay is the edge of the wide sheet which covers large parts of Essex and Hertfordshire. Its boundary conforms generally to the contour of the ground, but Messrs. Penning and Jukes Browne remark that in some cases where the clay occupies an old slope or channel it runs out in long tongues or down to lower levels. About Hildersham and Abington it rests on an old sloping surface, from the top of what may be called an outlying part of the escarpment down to the valley below. The Boulder clay in the Cambridge district is unstratified; it is of a dark grey or bluish colour, weathering to a lighter tint for some feet from the surface of the ground. It is variable in character, depending on the particular locality, and is usually sandy at base. The "boulders" in it vary in size, from mere pea-like pebbles to large stones, the majority of which are water-worn. To the north of the town of St. Ives this Boulder clay can scarcely be distinguished from the Oxford clay, of which it appears to be a local reconstruction. Its contained stones, however, always serve to distinguish it from the solid deposit mentioned. Here and there thin lenticular beds of sand, gravel and loam occur in this clay.

For the purposes of brickmaking the Boulder clay in the Cambridge district is severely handicapped by the nearness of the Gault. If the reader will turn to our sketch map in the last issue (p. 38) it will be noticed that on both sides of the valley of the river Cam, extending from Chesterton, through Cambridge, and on to Granchester and Harston, the Gault clay crops out and is readily available.

The Gault here forms an excellent brick-earth, and is extensively worked in places. It is a stiff clay and does not require washing, as it only contains a few of the usual dark brown phosphatic concretions. If we contrast this ready material with the Boulder clay we shall find that in practically all cases the latter would have to be washed, though it is capable of making an excellent brick in those localities where it is loamy, as near Newnham Hall and Barrington Hill. On the other hand, where this Boulder clay rests directly on the chalk, it is usually so full of chalk pebbles as to be too calcareous for good brickmaking. A formation such as this must of necessity depend on very local circumstances as to how far it may be utilised by the brickmaker. A yard may be opened in it on one side of the road and very good materials may be turned out; whilst on the other side of the road, perhaps not 300 yards away, another yard may be doing its best but getting sorry material at infinite trouble and at much greater expense. In fact, this is a case where nothing short of an actual exploration survey, with results laid down on a large scale map, is of any use.

At the same time the brickmaker may arrive at a few sound conclusions by a study of the government geological map (1 inch scale), on which the outcrops of the solid beds are laid down. It may be taken as granted that the brickmaker can interpret this map after what we have said in the *British Clayworker* from time to time. Well, the nature of the Boulder clay can be approximately understood if the reader bears in mind that that clay largely partakes of the character of the rock on which it rests. The Boulder clay mapped as resting on the chalk will be chalky, that on the Gault will be practically reconstructed Gault, plus a few stones, and so on. From this it is evident that the best localities in the Boulder clay for brickmaking in this district lie to the west of Cambridge on the broad expanse of Gault (see map, p. 38 *ante*) and on the Oxford and Kimeridge clays approaching St. Ives, in the neighbourhood of Dry Drayton, Lolworth and Knapwell.

In normal sequence above the Boulder clay, though hardly ever resting upon it in this district, come a series of gravels and loams. Neglecting the former, it may be noted that the latter has been worked at certain localities for brickmaking in a more or less spasmodic fashion. The loam is not often good enough, nor sufficient in quantity for the purpose mentioned. At Brinkley, however, this brick-earth is of good quality, and has turned out some fine bricks for many years.

Turning to the Drift deposits, younger in age than the Glacial beds, which in the majority of the districts hitherto described in this series of articles, have yielded one or two horizons of good brick earth, we find that in the vicinity of Cambridge they are mainly of gravel, and except in few instances are of no use to the brickmaker. One of these exceptions is near Whittlesford Railway Station, where finely laminated sandy loam, which has been used for brickmaking, occurs. This loam, which has been dug to a depth of 20ft. is grey at the base of the section, weathering buff towards the top. In other pits both loam and gravel occur.

The alluvium skirting the banks of several streams in the district usually rests on gravel, and is several feet in thickness below Cambridge. It consists of black peaty soil and black mud, and occasionally of fine, yellow, sandy silt. This has not been used for brickmaking, so far as we are aware, and in view of the more suitable materials near at hand, already described, will probably remain untouched by the clayworker.

Now let us say a few words on the solid beds of the district, the classification of which is given above. The only formations of material use to us are the Gault, the Kimeridge clay and the Oxford clay. These are generally similar in character, blue-black clays weathering to a lighter tint and containing small nodules and a few fossils. They are very thick and very suitable for the production of high-class bricks. The outcrop of the Gault is indicated on the sketch map (p. 38 *ante*); the Oxford and Kimeridge clays occur some 10 to 12 miles W.N.W. of Cambridge, at and near St. Ives. Crystals of selenite (a crystallised form of sulphate of lime) are common, especially in the two last-mentioned clays. The brick-yard in the Kimeridge clay north of Knapwell has yielded some excellent crystals, some of them being over four inches in length. Again, at Bluntisham, the Oxford clay contains innumerable minute crystals of the same mineral. Brick-yards are also situated at Fenton, near Pidley, and all round St. Ives. A large brick-yard just to the west of the town, following the authors already mentioned, yields the following interesting section:—

Section in Brick-yard at St. Ives.

Grey clay.
Fine purple calcareous sandstone.
Fine yellow calcareous sandstone.
Blue clay.
Two fairly persistent beds of hard sandy limestone, each about six inches to a foot in thickness, and with six inches to a foot of clay between.
Blue clay.
Hard sandy limestone in one or more beds, water level in bottom of pit.

It is worthy of note that the workpeople in the St. Ives district have for years called the septaria occurring in the clay "flint." Flint is a cryptocrystalline variety of silica, whilst septaria are tabular concretions of impure calcium carbonate.

THE GROWTH OF THE PAVING BRICK INDUSTRY IN AMERICA.

ACCORDING to Mr. H. A. Wheeler, in an address made at the last meeting of the National Brickmakers' Association, the introduction of shale for paving brick started at Peoria, Ill., which State has an abundance of shale, but scarcely any other paving material. The shales gave varied results, but enough good results were obtained to show that with proper care and discrimination excellent pavers could be made from shale. The use of shale introduced the new element of overburning ruining the product, which was unknown in the pioneer fire-clay plants, as with the latter the harder the burn the greater the percentage of first-class pavers. It was also found that shale required much more care in the speed of watersmoking and burning, while the margin was found usually quite narrow between the brittle, glassy, overburned or sewer brick and soft underburned or building brick.

The experience of the Illinois brick yards with shale, stimulated efforts in Nebraska, Kansas, Missouri, Iowa, Indiana and Ohio to utilize the local shales, which were abundant in these States, and many local trials were made of these shale-pavers by the smaller cities and towns with very varied results. The costly experience had again to be learned that while shale is shale, it is like all other kinds of clay, in that no two are exactly alike, and each has its individual peculiarities that affect the manufacture and the quality of the product. Also that shale adopted for economically producing a high-grade paver is by no means abundant.

The early shale experiments were also made in yards that were mainly equipped with up-draft kilns, and the temptation to sort too favourably into the higher-priced pavers resulted in too many underburned bricks being shipped in trying to get a reasonable percentage of paving grade from the central portion of the kiln. While down-draft kilns greatly increased the cost of equipping the yard, it was soon found necessary to adopt this style of kiln for successfully making paving brick if the quality of brick and the cost are considered.

The increasing number of favourable experiments of paving brick on the street early attracted the attention of the progressive clay machinery manufacturers to the opening up of this new field, and the application of their brains and experience led to many improvements in the quality and diminishing the cost of the brick, not the least of which was the early introduction of well laid out artificial tunnel dryers, which resulted in marked improvement in regularity and amount of the output with consequent lessening of cost.

As paving brick began to win its way and open up an attractive market the attention of manufacturers was drawn to the growing industry. In 1894 there was one plant in Galesburg, Ill., that had an annual producing capacity of 60,000,000 bricks, with a capital of $500,000.

The users of paving brick were at first confined to the smaller places, which were only too glad to avail themselves of an excellent paving material that came within their moderate means, and as soon as enough experience had been gained to verify the durability of good paving brick, its use rapidly spread through this class of consumers. But in the larger cities where much of the property can afford the best of pavements characteristic conservatism, the opposition of established contractors of other paving material, and the complications and vicissitudes arising from hungry political factors made the advent of paving brick slow and difficult, so that it has only secured a safe foothold in the large cities within the past five years. But the accumulation of experience, the improvement of quality and the better understanding of the manufacture and testing of paving brick by engineers has finally resulted in paving brick securing an accredited, assured position in its proper place in every city in the United States that it can reach on reasonable terms. While the early enthusiasts would have had every other kind of paving material give way to brick, its eminent merit needs no such sweeping statement, as no paving material has yet been found that possesses all the qualifications of an ideal paving material to a maximum degree. But the very easy traction, freedom from dust, low cost, slight repairs, durability, eminent sanitary character, ease of tearing up, suitability for steep grades and much less noise than stone, assures paving brick of a very large field in the largest as well as the smallest cities.

BRICKS FOR RIVER BANK PROTECTION.

A CHEAP AND EFFECTIVE EMBANKMENT.

THERE is scarcely a district in this country in which there are not places where the wash from streams, rivers, or estuaries is not doing more or less damage to the adjoining land or country. Up to the present time the only remedy for this has been the erection of expensive embankments, the cost of which would be far beyond what could be either afforded or profitably spent on such work. What has been badly wanted has been an effective system, at a reasonable cost, for the protection of river banks from the damage done by rapid currents or flood. It looks very much at the present moment as if the problem had been solved by an invention by Signor Giovanni Villa, of Milan. This invention has been tried in Italy in various embankments on the rivers Lambre, Olona, Ticinelle, and Po, the canal Vittabbia, and the torrent Sevese, some of which have stood the test since 1892. It has been tried also, and successfully, in France, Belgium, and Egypt. In this country, also, embankments on the system have been provided at Holehaven Creek, on the Thames, and on the Dee estuary, at Heswell, in Cheshire. The invention having been found to be successful, it is now being systematically introduced in this country by the River Bank Protection Company, Limited.

The system is very simple. The protection is afforded by means of a "mantle" of square bricks or prisms, 10in. by 10in. and 4in. thick, which are woven together by strong galvanised and annealed iron wires, and in such a way as to form a proper bond. For sea slopes or facings at the foot of cliffs the blocks used are heavier. This "mantle" is pliable, and when lowered into its place adapts itself to the conformation of the bank to be protected, and offers but little resistence to the current. It is, at the same time, unsurpassed for stability and durability. For a running stream or canal the "mantle" is made (or rather woven together) by a machine on a barge as it is laid down, and thus the system is applicable equally to the smallest bit of bank to be protected, or to the largest job for which an embankment might be required. Where the foot of a bank is exposed at low water no apparatus is necessary. The bricks used are usually the ordinary hard-burned bricks made from the alluvial clay which can be obtained almost anywhere and very cheaply. In this country they would be made in the district in which they were to be used. Of course, they would have to be made to the special pattern required.

The system is very cheap. So far as cost is concerned, the details were given a correspondent of the *Nottingham Daily Guardian* of the total expenditure on an embankment on the River Po (Italy), which was erected for the Municipality of Crespino. Here the bank of the river was protected for a distance of 300 yards, and the height of the "mantle" from the bed of the river to the top of the embankment was a little over four yards. The cost of the whole work was £300.

Such is a very brief description of a system of sea and river bank protection which seems likely to play a most important part in the immediate future, in the improvement of properties in this country.

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BOOK-KEEPING FOR BRICKMAKERS.—V.

BOOKS REQUIRED—(*Continued*).

Journal.—This is an intermediary book, used for making transfers from one account to another or from one ledger to another, and principally for writing off the accounts to Profit and Loss Account, at the end of a period.

Bills Receivable Book.—This book is for the purpose of recording bills received, and particulars of their ultimate disposal. The operations will be readily observed by a study of the specimen entries in the appendix. As a rule brickmakers do not need to give bills for their purchase, owing to the terms with customers usually being cash monthly, so that a Bills Payable Book is not shown here.

General Cash Book.—Very little comment is needed on this book as the specimen entries in the appendix explain its operation. It is advised that all receipts be paid to bank intact, and all payments made by cheque wherever possible. It will be noticed in the specimen entries that whenever cash is required for the purpose of meeting salaries, petty cash, or other items, cheques are drawn from the bank as required, but cheques and cash received from customers are paid direct to bank. A monthly balancing of the Cash Book is advocated, and especially when the items are numerous.

Petty Cash Book.—It is very desirable that a good system of petty cash payments should be adopted. The person in charge of the petty cash should be provided with a sum sufficient to carry him through the month, and at the end of that period a cheque should be handed to him for the exact sum spent as shewn by his Petty Cash Book. This has the obvious effect of restoring the petty cash to the original sum handed at the beginning of the month. By the addition of analysis columns the petty cash may be allocated to various accounts as desired, and a great saving is effected by posting the totals of these columns at the end of each month instead of posting each small item.

It must be borne in mind that no cash received from customers, however small, should go through Petty Cash, and the same remark applies to the payment of accounts which have been previously passed through the Invoice Book. Such items as these should pass through the General Cash Book.

The special features of the books recommended have now been dealt with. Of course in dealing with the books of account, some knowledge on the part of the reader of the system of double-entry book-keeping, on which the accounts described are based, has been assumed, as in the limits of an article such as this it would be impossible to satisfactorily discuss the double entry theory.

It should be mentioned in passing, that the bricks made each week may be conveniently recorded opposite the amount debited to Wages Account in the Impersonal Ledger, and the bricks sold may be noted each month when the sales are credited to Sales Account.

If a careful record be kept in this manner of bricks made and sold, it is a simple matter to prove the stock of bricks and obtain accurate figures for the preparation of statistics of cost and selling prices as hereafter touched upon. In a well-managed yard the difference between the actual stock of bricks and that shown on paper should be a surplus, in consequence of the men always making a few bricks over so as to allow for bad bricks sold. If any deficiency be shown the matter will require careful attention. The manager should inform the head office from time to time of any bricks used by him for repairs and extensions, and entries should be passed through the books accordingly.

The Final Accounts and Cost Statistics.

Having dealt in a general manner with the books to be kept, attention must be drawn to the benefits to be derived from a good system of accounts. If the books are carefully kept they will contain the material for the preparation of all the statistics which a careful brickmaker will require as to the cost per thousand of the bricks he is making, and of the average price per thousand at which he is selling. These statistics should be prepared at regular intervals of say one month, in order that proper comparisons may be made and each item of cost exhaustively dealt with. A specimen of an account containing the information before referred to is given in Form 13. Although stock is not taken into account every month, yet its fluctuations are readily noticeable by reference to the difference in the columns in which bricks made and sold are entered. When the books have been fully entered up for the month, the expenses should be entered from the various ledger accounts to their respective columns on the debit side of the trading summary, with the exception of carriage and discounts which are deductions from sales, the latter forming the principal item of credit in the account. This having been completed, the difference between the total debits and the net sales will give the month's profit subject to the before-mentioned fluctuation in stock. If an agreed sum is written off annually to provide for the exhaustion of the clay, a proportionate sum should of course be reserved in the monthly summary and a provision should also be made for bad debts. From the wages account may be obtained the number of thousand bricks made during the month, and this being made the divisor for all expenses shown on the debit side of the monthly summary will enable the total cost per thousand of making to be worked out. To arrive at the average selling price per thousand, the number of thousand bricks sold should be divided into the amount of the net sales.

EMPLOYERS' LIABILITY.

ARE YOU INSURED IN YOUR OWN COMPANY? IF NOT, WHY NOT?

By this time, every clayworker throughout the country will be in possession of a copy of the report of the British Clayworkers' Mutual Insurance Corporation, Ltd.,—and a very satisfactory report it is. It is hardly necessary to recapitulate here the reasons which led up to the formation of the Company. We did not want an Insurance Company of our own, and we tried hard to get existing offices to quote brickmakers a reasonable rate. They refused, and all the money necessary for our venture was subscribed in a few weeks. The existing companies laughed and predicted our funeral in less than three months. We have survived our first year, however, in lusty fashion, and have shewn what can be done by a little enterprise and spirit among the trade. It now remains for the trade to follow up their initial success by giving us a bumper this year. We are well aware that prices have dropped in some cases since we have entered the field, and that there are companies who are following us all over the country, and quoting ridiculous prices in order to tempt brickmakers to contribute towards the burial of their own scheme. We know the trade too well, however, to think that they will listen to any such folly. Other companies would do nothing for them until we forced their hands, and those companies are likely to do less now. The British Clayworkers' quotes one price and that a low one, it gives a share of the profits, it gives policy holders the opportunity of taking scrip. And it is run at a minimum of cost. Can any other office say as much?

The present cutting of prices will end in certain companies competing for the honour of carrying insurance risks for nothing. Into that competition we have no wish to enter, for we have no money to throw away in the game of "Beggar my neighbour."

The man who would throw over the Company that has procured him these low charges, for the sake of saving a few shillings is fortunately a *rara avis*, and he is certainly not the kind of supporter to rely upon. We look to the great body of loyal British Clayworkers throughout the country who possess some enterprise and who are determined to give a fair chance to a Company formed for their mutual advantage.

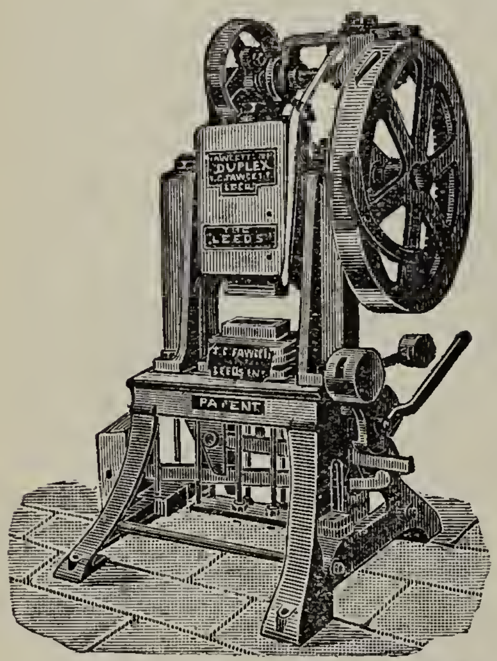
The Company is receiving a generous backing throughout the country, and with this there is little doubt as to its ultimate future. In any case, we have no hesitation in leaving that future in the hands of those most interested.

PIEBALD BRICKS.

The universal endeavour on the part of the brickmaker now-a-days to arrive at uniform tints in bricks of any pretence to excellence makes us almost forget that in parts of Spain, Central Italy, in Hungary, and parts of ancient Poland, architects were not at all averse to parti-coloured, or piebald bricks. Indeed, for plain structures, if we may judge from appearances, these kinds of bricks were rather courted. The facetious brickmaker may say to us that the architect had to take what he could get. That, however, was not the state of affairs at all, for side by side in buildings erected at the same time, uniformly tinted bricks may also be discovered. Neither was it a case of famine where the "seconds" had to be taken rather than keep the builder waiting. For, in that case, the architect would certainly not have employed the "seconds" for the façade, but would certainly have buried them in some inconspicuous position. It may be taken as granted, then, that the piebald bricks were used with a definite object. And we seem to be able to discern the object. A flat wall of uniformly tinted bricks is, after all, a very monotonous affair, and it may be questioned whether this was not recognised by these older architects, and a deliberate attempt made to modify it by breaking up the colour to some extent. Of course, where the work was unskilfully or inartistically done a species of patchwork was the result. But the proper blending of the parti-coloured bricks tended to more happy results. The question is whether the modern architect can be got to look at the question in the same light. Prejudice lies very deep, and what little art there does remain in the average architect-brick-buyer is mainly controlled by empirical canons which will not brook interference with impunity. It may be that after having been "taught" something of art he is unwilling to be progressive—afraid to strike out with something original—lest he should be jeered at by his fellow-artists. So we cannot expect that piebald bricks will become the rage in the immediate future. At the same time, anybody who has attentively studied the straining after effect in brick buildings by the modern architect, must be convinced that to girdle a deep red brick building with white or yellow bands of brick is of very questionable taste. At a distance the bands look as though their function was to keep the building together—to prevent it from falling to pieces. Glazed knobs and other devices are employed to break the monotony. There can be no doubt that the modern architect is ripe for improvement, as witness the straining alluded to. We suggest to him to give parti-coloured bricks a turn.

THE CLAYWORKER & THE ARCHITECT.

The complaint that clay goods will not make a good bond is a standard one with the architect, but he ought not to be so hard on the clayworker. In recent years great improvement has been effected in that direction, and it may be doubted whether bad laying, in these days of non-apprenticeship, is not quite as responsible as the shape of the materials for the manifest want of regularity in the building in many instances. The shrinkage of clays is now fairly well understood by the clayworker, and allowances are always made. A certain amount of warping, however, is inevitable with thin-shelled goods, as witness many varieties of terra-cotta. And we do not say that the clayworker is never at fault His chief difficulty lies in not being able to accurately test the hygro-



THE "LEEDS" BRICK PRESS

With Fawcett's Patent Stopping and Dead-weight Thicknessing Motion and Differential Pressure.

This Press is very largely used for pressing glazed bricks, which require to be all of exact equal thickness. It will press about 4,000 bricks per day with one boy to operate it, and will press them all of one exact equal thickness, although the quantity of clay may vary half-a-pound; this is done by the patent compensation arrangement of bottom moveable panel with levers and weights.

It is also suitable for pressing all kinds of plain and ornamental, red and glazed bricks, tiles, and terra-cotta work.

It is also fitted with my patent differential purchase gearing, for giving double purchase while pressing the brick, which is a very necessary and advantageous feature over other Presses.

The Machine is substantially built, and of the best materials; all bearings are bushed with best gun metal, and of extra large sizes. The pressure is obtained by our well-known patent toggle-motion levers, which are all of the best crucible steel; all the working parts can be seen while the machine is at work, and are easy of access for oiling, etc. It is very easily and quickly adjusted for different thicknesses of bricks. It is also fitted with automatic gear for stopping the pressing head at the top, after pressing the brick, and automatically lifting it out of the mould ready for taking away by hand instead of by the usual pushing arm; another brick is then put on, and by moving a small handle close to the operator, the machine starts and completes another cycle of operations.

THOS. C. FAWCETT, Ltd.,
Whitehouse Engineering Works, Hunslet Road, LEEDS.
Makers of Patent Semi-Dry and Plastic Machines, Steam and Hand Presses, Pug Mills, Solid and Perforated Bottom, Clay Grinding Pans, Clay Crushing Rollers, Clay Mixers, Sieves, Engines, Shafting, and
GENERAL BRICK & CEMENT MAKING PLANT.
ILLUSTRATED CATALOGUES ON APPLICATION.

metric condition of the clays employed, and he too often assumes that a certain earth will always shrink to the same extent. As a matter of fact, shrinkage depends on two essential things, the proportion of sand (or equivalent material) in the clay, and the amount of moisture the earth contains. The proportion of sand is readily ascertained, as is well understood in all important yards; but the proportion of moisture is ever varying, depending on the hygrometric condition of the atmosphere. A clay may be plastic and highly suitable for tile or terra-cotta making, and yet contain widely different proportions of moisture from time to time. The architect should bear this in mind, because it is neither feasible nor practicable for the clayworker to test the hygrometric condition of the earth employed, from day to day. Indifferent burning has been urged to account for much of the warping in the past; but we do not think the argument can be applied with the same force to-day. The fact is that architects should require more solid terra-cotta than they commonly do, and that would get rid of the difficulty to a large extent. There would be less tendency for the materials to bulge, or to become slightly concave, and there would be a corresponding improvement in the bonding. The architect is, no doubt, correct to some extent, however, and a man who can invent a ready method of testing the hygrometric conditions of earths employed in the manufacture of such goods as we have indicated will be hailed with rejoicing by all advanced clayworkers. Of course, the chemist has several means at hand; we do not allude to them, but to some device which could be readily employed by the ordinary workman to give him a definite result in a moment.

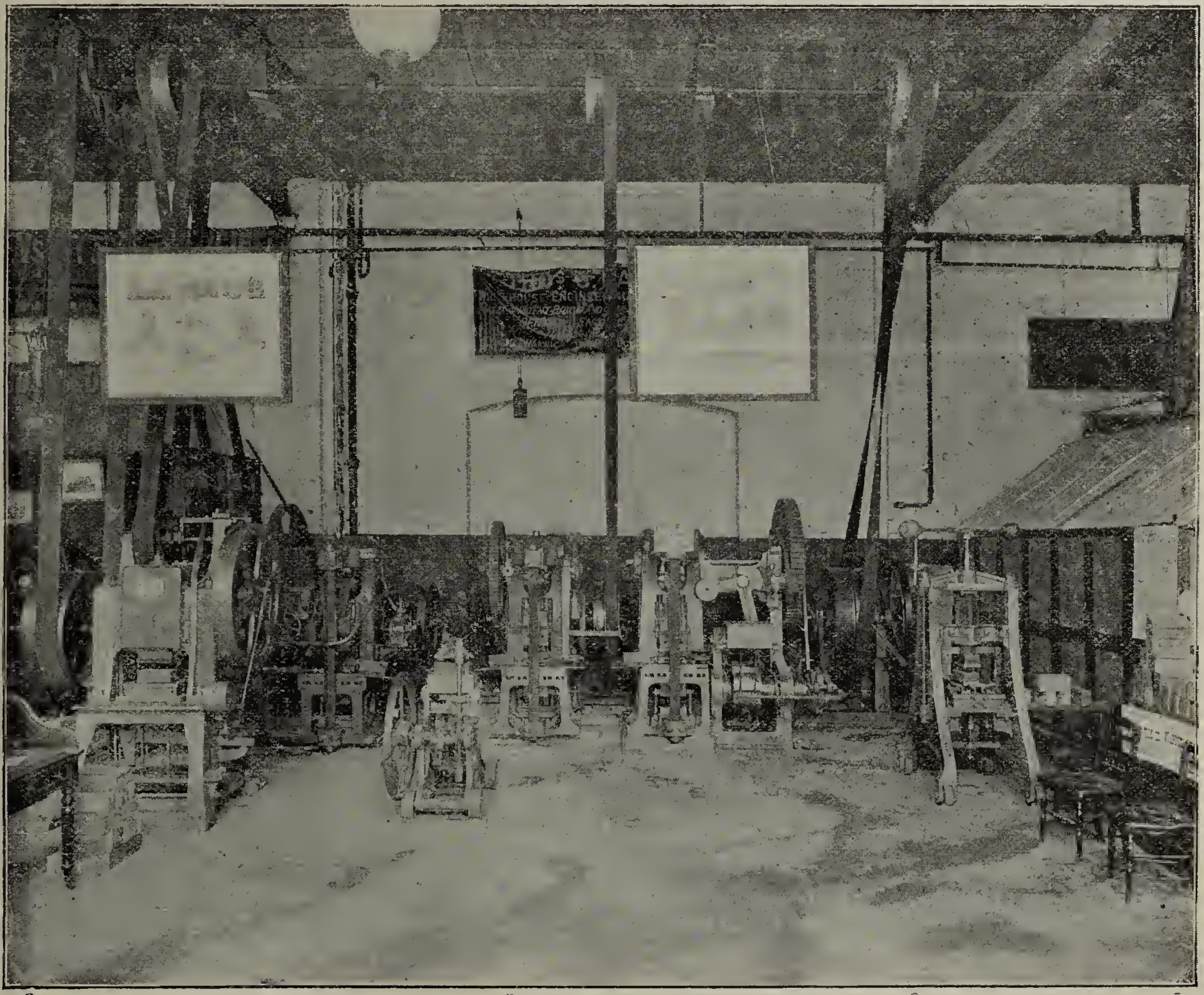
POINTING BRICKWORK.

Of late a most detestable practice has grown up in reference to the pointing of brickwork. Not contented with slap-dash plastering (for it cannot be called anything else), whereby the jointing is made, for the time, to appear about twice its proper thickness; not satisfied with the fine black mud which for years has done duty for pointing, and given the house a semi-funereal aspect, we learn that the architects of a very important "job" have ordered the pointing to be prepared of the same tint as the bricks. Anyone with the slightest feeling for the brickwork and having the faintest trace of artistic temperament about him will not fail to decry such an abominable treatment of any respectable building. The great charm of brickwork is the sub-division of the surface into the little rectangular pieces resembling at a distance a sort of mosaic work. The time has passed by perhaps when we can expect architects to have a little more of the spirit of the builders of mediæval Italy, and so introduce carved brickwork into the face and redeem its monotony somewhat. The mosaic appearance is the one redeeming feature from the artistic standpoint. We have no faith in those who build a house of yellow bricks and encircle it at intervals by a band of red bricks — at a distance these bands look as though they were intended to hold the building together, like so many hoops. But we must take exception to this monotonous colour pointing, which renders the surface of the house more like a barn door, than the front of a habitation intended for civilised beings.

MACHINERY EXHIBITS AT THE BUILDING TRADES EXHIBITION.

BY A BRICKMAKER.

To an old stager like myself London presents few charms or attractions in itself; but when there is an exhibition, that is to say, when the biennial event in the building trades takes place, I am only too anxious to spend a few days in the great metropolis. It would be more correct to say "in the Agricultural Hall," for while I am in London I practically live there. Every day I seem to see something fresh and suggestive, something which perhaps I may have passed by on the previous day; every day my notebook gets fuller and fuller, while my pockets bulge with catalogues and circulars to be taken home and studied at leisure. Then, too, there are the old friends one meets and the new acquaintances one makes, not to forget the dinner of the Institute of Clayworkers, which is always a memorable event. Altogether I manage to get such an amount of interest and enjoyment out of the exhibition as to provide me with material for many pleasant hours of reminiscence.



MESSRS. FAWCETT'S STAND.

There are many new things in my yard which I have introduced there to the astonishment of some of my neighbours and which would never have been thought of but for the information derived from my visits to past exhibitions.

Since the last exhibition two busy, prosperous years have gone by, and I saw remarkable evidence of this in an unexpected way directly I entered the show, for there was less brickmaking machinery in motion than usual. This was, to one who wanted as much as possible for his money, a little disappointing. I should have liked to see each machinery maker represented by his best machine and each machine actually running. But the reason was soon found—the machinery makers are so busy that they cannot spare either the time to attend the show or a *plant to exhibit!* Those who did exhibit are without doubt quite as full up with orders as those who did not, and they are to be praised for their public spirit, and I only hope that the wide advertisement which they have gained will well repay them for their enterprise.

Another evidence of the present prosperity of our trade was of quite a different order. Never were so many manufacturers represented by their goods as at the 1898 show, and never was the quality so splendid. There were firms represented from all parts of the country, and from places so remote that I found myself calculating what the railway rates must be and what the profits which could permit of paying the carriage on so many miles. In London houses, I suppose, a good article, especially if it possess special features, qualities or advantages, can command almost any price. I can look back now over more years than perhaps I care to reckon up, and I am confident that never before has such a magnificent collection of clay goods been brought together under the same roof as in the exhibition of 1899. The salt glaze goods and terra-cotta work were simply wonderful, and appear to me at any rate to have almost reached the acme of perfection.

The first stand I encountered was that of Mr. Wm. Johnson, of Leeds, but unfortunately for me it was a stand in the strict sense of the term, no machinery being exhibited. This was very disappointing, for I have always found much of interest shown by Mr. Johnson in previous years, and one naturally comes to *see* machinery and not to talk about it. The same thing obtained at the stand of Messrs. Alexander & Co., of Leeds, who, however, did bring up some bricks made by their machinery—and very good bricks they were. However, I am deputed to talk only of machinery.

Messrs. T. C. Fawcett, Ltd., of Hunslet, Leeds, I found very strongly represented with good examples of the machines for which they are so well and widely known. Here, too, I was at once struck with an absence of what might be termed *novelty*. The only new thing was a press, patented by Messrs. Fawcett & Gentry, but, unfortunately, I could not see it working. Neither Messrs. Fawcett nor any other of the machine manufacturers would be disposed to claim that they have reached finality in their machines, but for all that, it seems almost impossible to believe that any further improvements could be introduced into their machinery. Their patent "Leeds" press appears to be specially adapted for pressing glazed bricks, which, as everyone knows, require to be all of exactly the same thickness. I heard that a boy could work this machine—so easily is it balanced,—and could turn out without any difficulty about 4,000 bricks per day. One has not to leave much to the discretion of the boy, for the machine does the brain work apparently by means of a compensation arrangement of movable bottom panels steadied by levers and weights, so that even if the clay being dealt with is in excess, say to half-a-pound, the brick is of exactly the same thickness as though the proper amount of clay had been present. As for the semi-plastic brickmaking and re-pressing machines and the stiff plastic brickmaking and re-pressing machines which Messrs. Fawcett make, everyone knows what a reputation they have. One other machine should be noticed, namely, the Patent Hand-power Press. This is suitable for bricks and tiles, and the moulds can be quickly and easily interchanged. It is so mounted that it can be moved from place to place about a yard wherever its services may be required. Thus in the case of tile pressing, instead of having to take the green tiles out of the shelving and run them in barrows to the press and then back again to the shelves (a process which involves much shifting and invariably damages the "nuts" or "nibs" and the surfaces generally) the press can be moved down the alleys, and then all that is necessary as regards handling is to take the tile out of the shelf, put it into the press, and then place it back in its original place, so there is no jolting in wheelbarrows, and besides a great saving in time and labour.

On another day I visited Messrs. James Buchanan & Son, of Liverpool, whom I found exhibiting in one of the bays. The machine which first caught my eye at this stall was "Eddington's" patent machine for moulding sand-faced bricks; and I was reminded of the mortality of human life, for the inventor has gone over to the great majority. Well do I remember his cheery face and kindly ways. The machine seems to have been much improved by Messrs. Buchanan, who have introduced certain features which without doubt enhance its efficiency, although it was always a good machine. This machine can be used with solid wooden moulds for making red-facing sand-stocks, or even coursing and fancy bricks, and it costs very little money. But the machine is undoubtedly seen at its best when "opening" moulds are used. An ingenious device involving the use of a kind of trigger releases the mould when it, containing a brick, is placed upon the board, and then a clear space is left all round the brick and it leaves the mould with accurate arrises, perfectly square and without drop. This is most useful in small yards, especially where skilled brickmakers are with difficulty obtained. I knew a man once who could not get steady moulders, they were always going on the drink. He determined to put down these machines and dispense with the skilled moulder, and he now makes better goods at the rate of nearly 250 an hour with unskilled labour; anyone being capable of going through the necessary movements and producing good bricks. At this stall there was also shown William Wood's patent adjustable side-delivery brick-cutting table. This is made single or double, the latter arrangement being, in my opinion, the best, and it can be made to cut bricks or blocks to any size, from 6in. × 2in. to 14½in. × 8½in. The double cutting table weighs 18 cwt., and is very substantially made. So many of these tables that are on the market are constructed too flimsily. Wood's table can be used for any kind of machine. The firm also showed one of their steam power double brick presses, which they claim to present several improvements, and I think their claim is good, for several of the new features commended themselves to me. It is self-contained and worked by a single cylinder engine, though it can be adapted to any existing steam power, and it is seen at its best, I should think, when finishing bricks which have been made in an ordinary wire cut machine. The machine can produce a maximum output of 15,000 bricks per day. I was very much struck with an improved die which is being recommended for use with this machine; this die gives a brick deeply panelled on the top and bottom, and this facilitates its removal without spoiling the shape.

The exhibit of Mr. Richard Scholefield, of Kirkstall Road, Leeds, was certainly one of the best in the show. Brick machinery is apt to be, so to speak, very much "cast in one groove," but Mr. Scholefield has struck out a design of his own, and keeps to it. This design possesses striking features, and convinces anyone that it makes for great strength and durability. His well-known toggle press worked by lever power, which is one of the most efficient presses ever designed, was exhibited at this stall combined with a brickmaking plant on the stiff-plastic principle. One of the remarkable features of this machine is the absence of collars on the pug-shaft; this is effected by taking up the thrust from the end of the shaft. Anyone with a grain of engineering knowledge will realise the advantage of this arrangement. Then another feature which struck me very forcibly was the double pressure which the brick receives. All the parts which are exposed to any real wear and tear are made and fixed in such a way that they are easily removed and replaced. Hence, if the cylinder for example shows signs of wear, that portion at which the abrasion is taking place can be removed, and a local smith can do it. Mr. Scholefield is great at christening his machines, and I was rather amused to find that he had been at it again, and had dubbed one of his machines the "Diamond Jubilee." This machine is capable of making bricks on the semi-dry or semi-plastic system, and of re-pressing them after they are made. Of course it was shown combined with the famous toggle lever press of which the inventor is justly so proud. Mr. Scholefield also exhibited again his medium pug-mill brick machine which combines three processes, namely, crushing and pugging the clay and then moulding it into bricks. This is a capital machine for small yards in neighbourhoods where very fine goods are not demanded. I could not help examining the examples of gas engines shown by this firm, one being of 18 horse-power. I can quite understand that these might be very useful to those who have gas at their command, and every one knows that the efficiency of a gas engine is very much greater than that of a steam engine. But the six horse-power oil engine interested me most, and I am seriously considering the advisability of putting one down at my yard as an experiment, for I am really almost convinced that I should find it more economical than steam.

At the next stall I found Mr. W. A. Smith, of Northampton, who showed a large and varied assortment of brickyard requisites as well as brick machines, cutting-off tables and presses. I could have wished that some of this machinery had been in motion, for it is scarcely possible to form an opinion of a plant that is just standing idle, one might almost as well look at a photograph. The machines looked well-made, even though of somewhat light construction. They were represented by a horizontal and by a vertical brickmaking machine, both very suitable for working plastic clay, and the latter being fitted with expression rollers. There was also an excellent type of machine which can make by hand-power not only bricks but tiles, and a very good hand press which ought to prove most useful in a small yard. I was struck with the portability of all the plant I saw here, and I should think that this feature would commend the plant to many brick and tile makers who work on the old principles and do not care to launch out into large steam installations.

THE NORMANDY BRICK CO., LTD., showed their patent steam and hand power brick presses (Hughes' patent). These presses are simply wonderful, and quite different in construction and behaviour to anything else that I know of. The one which struck me most was the hand press, which is run by four boys when in work, one to press, one to feed, one bringing the bricks, and the fourth taking them away and laying them down. One of the great features of this press is that the pressure is effected by the panel, and consequently if a thin brick is put in, the panel is deeper than if a thick brick is put in the press, but the size of the brick and the density remain always the same. An ingenious device enables the bricks to be made with the edges rounded or even chamfered as well as square ; this is a decided advantage. The bricks are released from the press in such a way that they are never deformed by twisting or other movement. One other feature was pointed out to me by the courteous manager in charge of the stall, namely, that the construction of the machine is such that any parts liable to wear out can be replaced locally at a merely nominal cost. I see that this machine is patented in nearly every country where patents can be obtained, including Germany and America. Anyone can obtain a patent for anything, even perpetual motion, in this country, but in Germany and in America official search is made, and the patent is not granted until the authorities themselves decide that there is a real novelty. The Normandy Brick Company are to be congratulated upon their good fortune in securing their German and American patents, which prove that their machine is essentially different to anything else.

MR. ARTHUR KOPPEL'S STAND.

An interesting machine which was shown in working order was STANLEY'S BRICK MACHINE, to be seen at the stand of the Nuneaton Engineering Company, Nuneaton. This company design special machinery for dealing with those very stiff plastic clays which are so difficult to work in ordinary machines, and one of the sizes turn out 50,000 bricks a day. They also showed an excellent grinding pan : they make these in diameters varying from 4ft. to 9ft., and these pans are either over or under-driven. One of Stanley's top and bottom pressure hand presses was also exhibited. This seems to be a most useful bit of plant, and is worked by the old revolving wheel system, which personally I favour, having often taken a spell at it in my own yard in order to see what a man may reasonably be expected to do. The advantage of simultaneous top and bottom pressure is that a uniform degree of hardness and perfect edges are secured. An excellent steam pipe machine, fitted with steam-heated dies, was also described to me. These render the use of oil unnecessary, prevent oil cracks and reduce waste to a minimum.

A decided novelty in pug mills attracted my attention when passing by the stall of the Horsham Engineering Works, of Horsham. It was called, if I remember rightly, "The Vulcan," and really in strength the machine did not belie its name. The working parts are made of steel with the exception that the knives are usually of wrought iron, though they may be of cast iron; they are fitted with cross-cutting blades. The great feature of the mill appears to be the manner in which the knives are fixed to the shaft, which is such that they can be removed or replaced as desired. There are at least two models, and in one of these vanes as well as knives are bolted to the shaft and so arranged as to expel a solid clod of clay.

I was delighted with what I saw at the stand occupied by Messrs. J. T. Bowers & Co., of Sittingbourne. Here was nearly every conceivable kind of brick mould, and many of them possessed very special features, Bowers' patent solid-cover moulds, for example, being very much in evidence. These I first saw as long ago as the 1885 International Inventions Exhibition. I have used these moulds myself for some years and I can say that for durability combined with lightness they are not surpassed. Many types of wheel-barrows were to be seen at this stand, amongst which I noticed a slight improvement on the old-fashioned bearing-off barrow with the sliding top. A model of a crowding-barrow seemed to show that a man could do more work with it, for the wheel was further under the load than is usual in the ordinary barrow. A number of sieves, hack covers, pallets, strikes, etc., were shown which were noteworthy not so much for any novel features as for their excellence of quality.

I spent some time with the representative of Mr. Arthur Koppel, of Monument Street, London, E.C., whose world-renowned systems of portable railways, and rolling stock for use on them, were shown and described to me. In large works such as I have seen in Yorkshire, Peterborough, and near London, I should think these railways would save an enormous amount of labour. The tipping wagons for clay and the cars for green and burnt bricks all seem designed to provide the maximum amount of convenience and the minimum weight; being of steel, however, they are very strong. This firm also makes electric railways, which, I hear, are about to be introduced into the works of several large firms who already have the electric light installed. Who would have dreamed of such a thing as this forty years ago? Steel seems to be the material most favoured by this firm, and I noticed a very handy steel kiln barrow which is designed to supersede wood barrows for chamber kilns. I tried this and found that it was perfectly balanced by means of bearings which are adjustable along the frame.

Gas engines are coming very much into use for brick-yard work, so I was told by the gentleman whom I saw at the stall of the National Gas Engine Co., Ltd., of 117, Queen Victoria Street. E.C. I have always believed that the efficiency of the gas engine is superior to that of the steam engine; and I could appreciate several mechanical advantages in the engines which I saw, most of which were fitted with a self-starting gear, which prevents all danger when beginning to work.

Messrs. Crossley's gas and oil engines of the "Otto" type are too well known to need special description, and the firm is probably the pioneer in the trade.

Other gas and oil engines were to be seen at the exhibit of Messrs. Blackstone & Co., Ltd., of Stamford. Some of these I found were specially designed for brickmaking machinery, and must confess they looked neat and handy enough and strong too. This firm told me they had such confidence in their engines that they would guarantee them against fair wear and tear for a given period. The oil engine, contrary to what I had imagined, seemed to be very easily managed, and so the services of a skilled engineer might be dispensed with, and this is always an item to be considered in the cost of making per thousand. It is claimed that these oil engines, too, are absolutely free from danger.

Whilst looking at some new machine belting at the stand of the Southwark Manufacturing Company, Southwark, S.E., I found that they were also exhibiting various brick-yard accessories, but chiefly of use in the engine room and boiler house. Everything seemed to be of first-rate quality, so different to what I used to have to put up with years ago, and the firm do business, too, on very satisfactory terms, offering to send their textile and leather beltings on trial for three months, to be returned if not satisfactory. Nothing could be better than this. One likes to see things sold on their merits.

I spent a long time with the Blackman Ventilating Co., Ltd. (London), watching their system of drying bricks, tiles, etc., at work. In this system, of course, the well-known revolving fan provides the current of air. If clays will stand rapid drying the system is excellent. It seems so scientific too. A steam air heater is employed in conjunction with a bye-pass for cold air, and the temperature can be regulated to any suitable degree to suit the different clays, so that a strong plastic clay is more slowly dried than a poor porous clay. The Blackman people also showed me an ingenious apparatus for spacing or separating bricks and attachable to a wire-cutting table, which ought to prove extremely useful in some brick-yards.

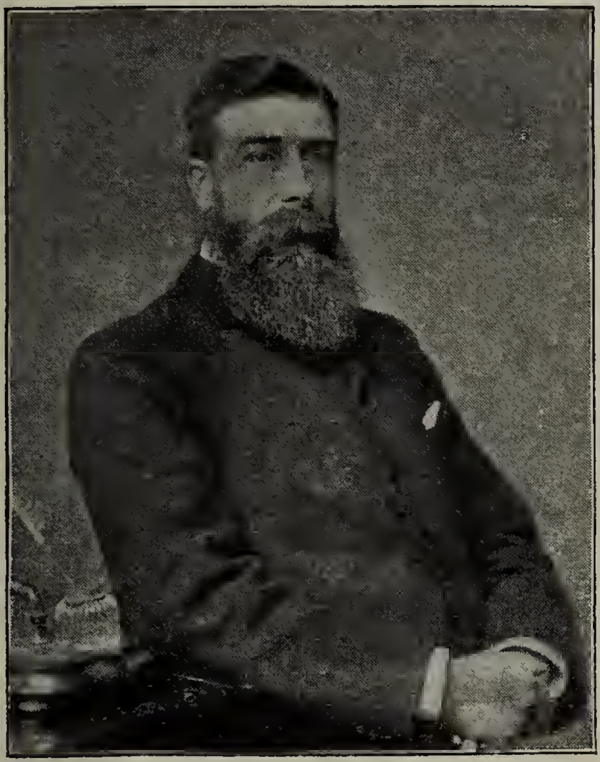
Patent trucks with sliding wheels proved an interesting exhibit, and though of general usefulness seemed to me to be extremely suitable for brick-yard purposes. They were shown by Mr. H. C. Slingsby, of Gray's Inn Road, London.

Messrs. C. A. Zadig & Co., of London, had a collection of exhibits demonstrating their system of portable railways and wagons. The latter for tipping purposes are very convenient and handy; they combine, with great carrying capacity, the advantage of lightness, and can be tipped from the side instead of from the end. Some light handy wheelbarrows were also on view.

Although I have already taken up more space, I fear, than Mr. Editor approves of, my notebook is still full of material upon which I have not yet drawn. I cannot close, however, without remarking upon two or three more of the stalls in which I was interested. For example, Messrs. Julius Hulsen & Co. explained to me how they prevent scum by using carbonate of barytes, which is mixed with the clay in certain proportions. My own goods always burn a bright, clear red, but I saw shocking examples of badly scummed bricks in the new buildings which I noticed in the course of erection in London, and if Mr. Hulsen could only cure this or be given his chance it would be a good thing, for scummed bricks spoil even the best of architecture. Finally, I must not omit the kilns, only two types of which were on show, although the names of the patent kilns are legion. Drawings of the Belgian kiln were shown by Messrs. Wm. Jones & Sons, of Buckley, and also some specimens of goods burnt in this kiln which were very good. It would be much better if a model of this kiln were made and shown, one that could be taken to pieces for example, for an average man like myself experiences difficulty in understanding mere drawings. This firm also showed me some plans of a down-draught circular kiln which they claimed to possess certain improvements. I was interested to find, however, that models could be seen of Ashby & Batley's patent brick dryer at the stand of Messrs. Hooper & Co., of Southampton, which dryer I saw described recently, and which is an excellent invention for certain clays, and of Sercombe's continuous kiln at the stand of Messrs. W. Sercombe & Co., Leicester, the speciality of which firm is too well known to need any description by me. These models were very well made, and showed the special features of the plant they represented almost at a glance.

DEATH OF MR. T. J. BURGESS.

WE much regret to have to record the death of Mr. T. J. Burgess, secretary for ten years past to the North Staffordshire Brick and Tile Makers' Association. Only last January we had the pleasure of meeting him at the Annual Meeting of that Association, and there is a pathetic premonition connected with his death in the fact that, at that meeting, he said, "I will do my best for the Association if I live." His death is a great blow to his employer, Mr. Jno. Nash Peake, The Tileries, Tunstall, Staffordshire, who held him in the highest esteem, both for his business acumen and charm of disposition. Mr. Burgess was a man universally liked, a fine type of the quiet, earnest, shrewd, independent Nonconformist. A genial man with many friends, he will be sadly missed in Tunstall, where for many years past he had made his home.


THE LATE MR. T. J. BURGESS.

COMPANIES' MEETINGS.

HAMBLET'S BLUE BRICK CO.—A GOOD YEAR.—An ordinary general meeting of the shareholders of Hamblet's Blue Brick Company, Ltd., was held on May 20th, at Winchester House, Old Broad Street, E.C., under the presidency of Mr. Joseph Hamblet, the chairman and managing director of the company. The Secretary (Mr. Henry Parker) having read the notice convening the meeting, the Chairman said: Gentlemen, this is our first ordinary general meeting, and it affords me much pleasure to submit to you our report, with statement of accounts, to the 31st March last. Before asking you to pass them I wish to make a few remarks, but I shall not detain you long. The business of the company has more than maintained what we held out in the prospectus, although up to the present time we have not developed the mines of coal, &c., belonging to the company. In the opinion of your directors it will be better to do this at a later period. You will see by the statement of accounts that our net profits for the year amount to £11,724 12s. 10d., after deducting the following items:—Repairs, renewals and depreciation, £3,876 17s.; directors' fees, £1,050; and debenture interest, £1,959 19s. 8d. Our bad debts for the year are only trifling, and the amounts now owing to the company we have no doubt are absolutely safe and will in the usual course be paid. We propose to distribute (as you will see by the report) the profits as follows:—We have already paid 6 per cent. on the preference shares, and we propose now to pay 10 per cent. per annum on the ordinary shares, to place £2,000 to reserve fund and to carry forward £1,097 17s. 7d. to next year. I may say trade still keeps good and at the present time we are making more bricks than we ever did before. Mr. Bernard Thomas seconded the motion, which was then put and carried unanimously. Mr. John Parker, A.M.I.C.E., proposed the re-election of Major Hector Tulloch, C.B., as a director. A shareholder seconded the motion, which was unanimously agreed to. Major Tulloch, in acknowledging his re-election, said he thought the shareholders ought to be pleased with the result of the year's trading. If all the holders of the preference shares had been present he was sure they would have been delighted to hear that the directors had decided not to pay 15 per cent. on the ordinary shares, as they might have done, but to put by more than 33 per cent. of the profits in order to conserve the best interests of the company. Of course, the satisfactory result of the year's trading was due in a large measure to their managing director, Mr. Hamblet, who had managed the affairs of the company in such a way that it was in a most flourishing position, and gave good promise for the future. (Applause.) On the motion of Mr. H. Parker, seconded by Mr. Thomas, Mr. J. Squiers, chartered accountant, Birmingham, was re-elected auditor of the company. A vote of thanks was accorded to the Chairman and directors.

GOVERNMENT'S INNUMERABLE RETURNS.—At Cheltenham Police Court Messrs. R. R. and W. H. Pearce were charged under the Quarries Act, 1894, by Mr. I. S. Martin, H.M. Inspector of Mines, with not having on or before the 1st of February sent to him a return of the number of persons employed and mineral brick clay wrought in their Folly Lane Brick Works Clay Pit. Having pleaded guilty, and set forth that the reminder sent on the 31st December had been overlooked, and that when the second arrived on 16th February it was allowed to remain over for 10 or 12 days owing to the absence from home of one of the defendants, it was stated by Mr. Pearce that they filled up the innumerable returns called for by Government now-a-days to the best of their ability. Fined £2 and 10s. 6d. costs.

INJUNCTION AGAINST A BRICK COMPANY.—Before Mr. Justice Stirling, in the Chancery Division on May 19th, Mr. Upjohn moved on behalf of plaintiffs in Hamblett's Brick Co., Ltd. *v.* Townsend, for an injunction to restrain the defendants from digging out marl, a clay used for the manufacture of bricks, from the plaintiff's land adjoining defendant's land at West Bromwich. Counsel said that what happened was that the defendant, having exhausted the marl on his own property, dug right up to the boundary with plaintiffs, and then went down vertically on the division line between the properties. The result was that plaintiff's loose marl tumbled down into the excavation, and on a tram line he had laid down for the purpose, and used it in his brick manufacture, not only thereby appropriating the plaintiff's property, but depriving their land of its proper support as well. By this means 829 cubic yards had really been excavated from plaintiff's land, and in one place the whole of the surface had fallen for a depth of 17 yards back.—Mr. Justice Stirling granted a modified injunction.

THE LAW.

The Lead Dust Question.—At Longton, James Wright, earthenware manufacturer, was fined 10s. for neglecting to provide in the ground-laying department an exhaust fan to remove lead dust. This is the second case in the district. The factory inspector stated that the Home Office thought sufficient lattitude had been allowed manufacturers, and they were now determined to prosecute all who did not conform to the special rules.

"Improving the Colour of Bricks."—A remarkable claim.—On May 31st, at the Northwich County Court, an extraordinary action occupied his Honour Judge Wynne Ffoulkes for some five or six hours. Charles Mountain Blades, a well-known analytical chemist, of Northwich, claimed from Charles Wheldon, of the Erith Brick, Tile and Terra-cotta Company, of Coed Talon, Mold, the sum of £50 for professional services rendered to the company. Evidence showed that, as the result of a note in the *British Clayworker*, the defendant wrote to the plaintiff asking if he could advise how to remove scum from bricks, and how to improve the colour. It was decided that plaintiff should make analyses of the clay at £4 4s., and that he should subsequently undertake experiments for which he would make no charge until "a successful result was obtained, when it would be a matter of mutual agreement as to fee." Sample after sample of blue brickettes was sent by the plaintiff, and his work, he stated, extended over ten weeks. On February 25th plaintiff paid a visit to defendant's works and ascertained, he deposed, that dry salt was being used in the manufacture of blue bricks. He instructed the defendant as to the action of wet salt, which he guaranteed would produce the proper colour. At this time plaintiff had elaborated a chemical process for the cheap and successful production of blue bricks. He did not at this stage divulge his scheme, but on returning to Northwich he wrote that it would be very advantageous, and asked for £25 on account of £50 for the process and the work he had done. Defendant replied that the price was prohibitive, but that he would pay £5 down and £5 on the successful carrying out of the scheme. For the defence it was contended that the plaintiff had done no service of value, and that the wet salt process he had described had been in use at the same works for over twelve months. Blue bricks were produced in support of this contention, and the contractors for the Great Western Railway Company and other witnesses averred that the blue bricks now being manufactured by the firm were exactly the same as those supplied early in 1898. His Honour held that there was no value in whatever the plaintiff recommended, and gave judgment for the defendant with costs.

The Law Regarding Explosives.—Chirk Castle Lime Company, Limited.—In this case Mr. Cartwright, Chester, appeared to prosecute on behalf of Mr. Jones, inspector under the Metalliferous and Mines Regulation or Quarries Act, and Mr. Kendrick appeared for the defence. The defendant company was alleged to have committed two distinct offences under the Act, on the 27th March last. The respective offences, as stated, consisted in keeping in boxes insufficiently secure, certain explosives, to wit 100 detonators and 80 detonators.—The inspector stated that on the 27th March he paid a visit to the company's premises and found the explosives' boxes in the shelter. They contained large quantities of explosives, independently of the detonators, and also a quantity of nails. The explosives contained in the boxes were the most sensitive in existence.—By Mr. Kendrick: The detonators were kept in small tin boxes by themselves, and were protected with sawdust. The defendant company had complied with the rules and regulations, and there had only been one accident in 24 years, the rules being very strict and read out to the men.—Mr. W. Roberts, manager, was called, and said he had been in the employ of the company for the last 23 years. All the little tin boxes, such as the one now produced, were packed in sawdust. A set of rules was drawn out regarding the storage and use of these explosives for the guidance of the men.—Mr. Jones, recalled, said the company was registered under the Act; and Mr. Kendrick contended in his defence that there was nothing to show from the evidence that the company had offended in any way. These charges seemed to be multiplied for the sake of heaping up penalties, costs and expenses. The bench having retired to consider their verdict returned with the opinion that a technical offence had been committed on each of the informations, and they would fine the defendants 1s., and the ordinary court costs in each case, and suggested that greater security should be provided and more stringent rules made.

Railway Companies and the Question of Minerals.—Rugby Portland Cement Company *v.* the London and North-Western Railway Company.—This was the Railway Company's appeal from a judgment of Justices Wills and Kennedy, making absolute a rule for a *mandamus* directing them to take up an award. The Prosecutors were Messrs. Walker, who trade as the Rugby Portland Cement Company, and they claimed, as owners of the land, the right to work a certain seam of stone running under a portion of the Company's railway near Rugby Station. The Company, who when the line was made some sixty-five years ago only had a license to use the surface of the land conveyed to them, alleged their right to stop the Plaintiffs from working minerals under the line on paying to them a sum, to be ascertained by arbitration, by way of compensation. The matter went to arbitration. The Plaintiffs said that the Company's rights were regulated by certain sections of the Lands Clauses Consolidation Act and the Railways Clauses Consolidation Act of 1845. Neither of those Acts gave the Defendants the right to buy the land when a claim for compensation was made, and, therefore, the Plaintiffs said they were entitled to retain their ownership in the subsoil, and to be paid compensation for not working the minerals. The Defendants, on the other hand, contended that if they were to compensate the Plaintiffs for not working the stone in question, they were entitled to purchase at a price to be fixed by the Arbitrator the whole of the Plaintiffs' rights in this property, and thus become the freeholders. They alleged that their private Act of 1846, which consolidated various other Acts they had obtained from 1833 to that date, gave them a right to become the purchasers of the land, and the question turned on whether the Company's private Act of 1846 incorporated or excluded the material provisions of the two public Acts of 1845 above-mentioned as to the rights of the respective parties to take the minerals as provided by the minerals sections of the Act of 1845. Sir Edward Clarke, Q.C.; Mr. Page, Q.C.; Mr. A. Underhill, and Mr. C. Percival Clarke appeared for the Railway Company; and Mr. Dugdale, Q.C., and Mr. A. J. Noble for Messrs. Walker.—At the conclusion of the arguments the Court took time to consider its opinion. Lord Justice A. L. Smith, in the course of his judgment, now said the decision that Lord Justice Romer and himself had come to was that the arguments put forward on behalf of the London and North Western Railway Company, the defendants in the Court below and the Appellants in that Court, did not avail them. They thought the rule for a *mandamus* had rightly been made absolute to compel the Railway Company to take up the award. The appeal of the Railway Company against it would be dismissed with costs. Lord Justice Collins said he was compelled to hold—though he did so with great deference—that the appeal should be allowed. He did so because he thought the Umpire had not jurisdiction to make the award, and if that was the case then clearly this *mandamus* ought not to issue directing the Railway Company to take up an award which was invalid. Lord Justice Romer delivered a judgment concurring with Lord Justice Smith. By a majority, therefore, the appeal was dismissed. Mr Page, Q.C., asked for a stay pending an appeal to the House of Lords. Lord Justice A. L. Smith said that as a general rule such an application would be refused, but the facts of this case were peculiar by reason of its being an appeal against the taking up of an award, the validity of which was challenged. The application would, therefore, be granted.

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THE WORKMEN'S COMPENSATION ACT, 1897.

OBJECT LESSONS TO THE TRADE.

A SLIP.

A brickmaker named Arthur Charles Woodward was admitted to the Ipswich and East Suffolk Hospital, suffering from a twisted leg, sustained through stepping back and slipping, whilst engaged in loading a tumbrel with bricks.

KILLED THROUGH A FALL OF CLAY.

An inquest was held at Brampton, Chesterfield, on the body of William Cooper, aged 31, coal miner, who was employed by Mr. J. Pearson at the Brampton Colliery clay quarry. The deceased was filling a wagon with clay on the morning of the 19th ult., when, without any warning, a quantity of clay fell from the side of the quarry. He was knocked down, and completely buried by the fall. When extricated he was quite dead. Another man, at work in the quarry at the time, named Peter Bradley, was partially buried, and he is now in the Chesterfield hospital. Mr. Walter Holland, the manager, said he was at the top of the quarry ten minutes before the slip occurred, and saw no indication of any crack in the clay. The soil on the top of the clay had been removed, and the piece which fell was slightly overhanging, but had not been undercut at all. The only reason he could give for the fall was the heavy rains recently, and the fact that the clay hole was close to another which was now disused. Mr. Pearson said he was at the place half an hour after the accident, and could form no theory to account for the fall. A verdict of "accidental death" was returned.

A FOREMAN SCALPED.

A serious accident befel James Clark, the foreman at the Weldon and Corby Brickworks. In turning sharply round his head caught a pulley wheel revolving at a high rate of speed, with the result that the unfortunate man was partially scalped and rendered unconscious.

INJURED THROUGH FALL OF WALL.

A young woman employed as a brickmaker by John Nimmo & Sons, Armadale, Scotland, was admitted to the Royal Infirmary suffering from severe general injuries, received through the fall upon her of a brick wall in a kiln while following her employment. She lies in a serious condition.

17/6 A WEEK FOR A MAN'S ERROR OF JUDGMENT.

At Nuneaton County Court, William Moran, sinker, was the appellant, and the Bedworth Brick and Tile Company were the respondents, in an Employers' Liability case.—The case for the appellant was that on August 27th he went down a shaft that was being newly sunk, and the shaft being infested with choke-damp he was overcome, and falling to the bottom sustained such injuries that his left leg had to be amputated. A man who went to his rescue was killed.—His Honour held that it was only an error of judgment on the part of the man, and awarded him £37 for the 20 weeks in which he was out of work, and 17/6 a week until further order.

KILLED WHILE CLAY DIGGING.

Mr. J. V. T. Lander held an inquest at New Dale, near Wellington, on Henry Hughes (55), who was killed when digging for clay at the Hadley Lodge Brickworks, Salop.—The jury returned a verdict of "Accidental death," and intimated that sprags should be provided, and the men engaged at the brickworks compelled to use them.

SUNDAY LABOUR IN SCOTLAND.

Sheriff Fyfe, Glasgow, has decided an interesting point regarding the legality of Sunday labour in connection with an action in which a labourer named Andrew Murray, 258, Garngadhill, Glasgow, sued William Pollock, brickbuilder and contractor, 166, London Street, Glasgow, for compensation under the Workmen's Compensation Act in respect of a serious injury to one of his hands sustained on 31st January last while in the defendant's employment. The compensation claimed was 11s. weekly, being the half of pursuer's average weekly wage. The defender on 29th March offered the pursuer permanent employment as a watchman at a weekly wage of 18s., but to this offer was attached the condition of duty not only during each night of the week, but during the daytime each Sunday. The pursuer agreed to accept this offer of employment, if the condition of Sunday labour (to which he had conscientious objections) were not insisted on, but the defender adhered to that condition, and pursuer on that ground declined to enter his service. His Lordship now finds that in law the condition of Sunday day service is illegal, and he decerns for the pursuer, finding him entitled to compensation at the rate of 11s. His Lordship in a note bases his judgment on the House of Lords case of Philip v. Innes (1837), where it was decided that according to the law of Scotland a man could not be compelled to follow on Sunday, as on week days, his "ordinary calling" unless the circumstances raised his work to one of necessity or mercy. The defender's offer of employment must be taken as he made it, and, as he attached to it a condition which the law did not sanction, his Lordship must treat it as null, and so pursuer was not affected by it, and was entitled to his statutory compensation. Apart from the strictly legal aspect of it, pursuer also pleaded that the continuous Sunday condition was not reasonable. The evidence, his Lordship said, had gone to show that it was the custom in defender's work, but it did not by any means show that it was a general custom that a night watchman's duty included Sunday day watching, and if it were necessary to decide the point his Lordship thought there was an absence of evidence to establish that the condition was necessary or that it was reasonable.

AN IMPORTANT RULING.

CLAYPIT NOT UNDER THE ACT UNLESS FACTORY BEING WORKED.

At Stroud County Court, on May 16th, his Honour Judge Ellicott delivered judgment in the action brought by Lucy Lancelott, widow, of Cranham, who sought to recover £150 from William Henry Gardner, of the Cranham Potteries, for the loss, through an accident, of her husband, John Varley Lancelott, a clay-digger, who was killed by a fall whilst working in a clay pit. The claim was made under the Workmen's Compensation Act, 1897. His Honour said it was argued that either the pottery works, clay mill, or clay pit composed the "factory," and that the clay pit was sufficiently near to them to be described as "about" a factory. To his mind, if there were simultaneous or nearly simultaneous operations of getting clay, grinding it, and making it into pots—the clay being more or less continuously wheeled from the pit to the mill and from the mill to the pottery, and the same men being employed indifferently at either occupation—there would be sufficient causal connection between the pecking down of the clay and the making of the pots to enable the Court to hold that the accident arose out of and in the course of employment about a factory, or at least that the deceased was working for hire in assisting in making earthenware. Unfortunately for the application, neither the pottery nor the claymill was at work at the time of the accident. The pottery had been closed for some time, and the claymill was out of working order. The only work in progress at the date of the death of the deceased and for some time previously, was clay digging in a clay pit. He found that the clay digging and the pottery work were independent employments—that the claypit was not a factory, and that the pottery works and claymill were closed for work on the day in question and had been so closed for a fortnight previously. In face of these findings of fact, he failed to see how the applicant was to succeed. There would seem to be no sufficiently causal connection between the digging of the clay one month and the grinding and making it into pots another month so as to make the word "about" available for fixing the respondent with liability. It was true that clay must be dug before pots could be made, but where, as here, the operations were distinct, and a substantial interval of either space or time separated the digging from the pot-making, the causal connection was broken, and the Act could not apply. The claim, therefore, failed, but as it was no easy task to place a satisfactory construction upon the combined operation of the Acts of Parliament, and the applicant might wish to take the opinion of the Court of Appeal, he dealt with the other defences, and proceeded to assess compensation. This he found to be £150.

AN EXTRAORDINARY TANGLE OF LEGISLATION.

In the City of London Court, on the 26th ult., Mr. Pitt Lewis, Q.C. (Deputy Judge), disposed of a case under the Workmen's Compensation Act, 1898. Fred Martin, labourer, sued the London and India Docks Joint Committee to recover compensation for personal injuries which he had suffered while in their service. The applicant while working close to a skylight near the roof, the plant on which he was standing gave way, and he was thrown to the ground. His jaw was fractured, and he sustained other injuries. Oddly enough he had only been in the service of the Dock Committee for a day and a half, and after the accident they forwarded him 7s. 3d. as his wages. The defendants' case was that no liability could attach to them at all. The Act of Parliament made them liable for accidents happening in any "dock, wharf, quay, or warehouse." The warehouse where the plaintiff met with his injuries was situate a mile away from the defendants' docks. It did not follow that the plaintiff would have earned 26s. or 30s. per week. He was a casual hand, and was only entitled to have his damages measured according to what his average weekly wages would have been. In delivering a considered judgment, the Deputy Judge said the case was like solving a conundrum, arising, as it did, out of that extraordinary tangle of legislation called the Workmen's Compensation Act. His decision must be unfavourable to the plaintiff, for he was bound to hold that he could not recover.

REPLIES TO QUERIES.

THE CARRIAGE OF FIRE CLAY.—In the railway classification fire clay comes under Class A at the mineral rate, and therefore is in the same class as coal. "J. B." should ascertain if the figure charged him for coal traffic is "exceptional" or "special." If not the company should carry fire clay on the same terms. If, as is possibly the case, the coal rate exists by favour of the Railway Company, "J. B." would do well to place the whole matter before the chief Goods Manager at Paddington.

A BRICK FLOOR.—To make a serviceable brick floor, assuming the soil to be firm and well drained, excavate the ground to an even surface 8in. below the grade of the desired floor. Tamp well with heavy rammers to secure a firm foundation, fill in with clean sand or gravel to within 3½in. of the grade, making a crown of about 2in. between pits for drainage; wet this, tamp with rammers, and trim off with a straight edge, taking care to get a good even surface brick on edge, close to each other, and breaking the joints so that the tops come one-half above grade. After laying, roll the bricks with a 2,000lb. or 3,000lb. roller, cover the surface with 1in. of fine sand, and broom it well into the cracks, or fill the cracks with cement grout. A concrete foundation is recommended, but is not necessary except the ground is not firm or where the floor is to support very heavy loads. For blacksmiths' shops or foundries, the natural earth frequently forms a suitable floor. If the soil is too soft, cinders or clay may be added.

TRADE NOTES.

The Strike at Messrs. Doulton's.—The strike of clay-getters at Messrs. Doulton's works in the Staffordshire and Worcestershire districts, which has lasted about six weeks, has practically ended. Most of the men have now resumed work. The men originally came out on strike in consequence of twelve workmen being discharged for refusing to work overtime.

French Bricks for England.—It has generally been thought that the British brickfields and cement works were sufficient to supply the requirements of British Builders, but Mr. Consul Taylor, in a report to the Foreign Office, calls attention to the fact that the exportation of bricks to England from Dunkirk, which in 1896 only amounted to 397 tons, last year reached a total of 12,557 tons. The bricks were taken from Dunkirk in barges, and are for the towns and ports of the south-eastern counties. Cement has also been exported to the United Kingdom to the extent of 4,645 tons.

Messrs. Keeble in Yorkshire.—Messrs. Keeble Bros., the enterprising proprietors of the new Peterborough brickworks, Peterborough, have, we are informed, taken up the lease of the proposed Selby Brick & Tile Company, of land acquired from the Earl of Londesborough for the purpose of establishing similar works at Selby. The land on which the works will be erected is situated alongside the canal on the Selby and Bawtry old Turnpike Road, and is contiguous to the proposed new tramway connecting Messrs. Cochrane and Cooper's shipbuilding yard with the main line from London to York.

Death of Mr. Mouat, of Morpeth.—On May 31st, the sudden death of Mr. John Mouat caused a painful sensation at Morpeth, where he lived and carried on an extensive business as a house furnisher and brick manufacturer. As he was accustomed to do, just before leaving for the train, Mr. Mouat went into his garden to look to his greenhouse. A minute or so after he was found by his youngest daughter lying in the stoke-hole. Dr. Philip certified that death was due to an affection of the heart. He was a Primitive Methodist, and had been a local preacher for about 20 years. He was 45 years of age, and leaves a widow and four children.

Strange Fatality at a Wigan Brickworks.—Mr. L. R. Rowbottom, the borough coroner of Wigan, held an inquiry at the Wigan infirmary relative to the death of a brickmaker named Margaret Grundy, who was fatally burned through carrying hot cinders in her apron.—William Topping stated that he was an engineman employed by Messrs. Liptrot and Dawber. Deceased asked him for some cinders to cover a damp place, where she was standing. Witness gave deceased a spade full in her apron, previously warning her against carrying them in this way. After deceased had gone four or five yards away from witness, he heard shouting, and saw deceased on fire.—By the coroner: they used oil for the machinery they worked with, and the woman's clothing had become oily all over. Sarah Townley, also a brickworker, stated that she had no need to carry cinders to her place since it was dry.—By Mr. Dawber: Deceased could have had a bucket or a spade. The proprietors had warned deceased and others to keep away from the engine house.—The coroner briefly summed up, dwelling upon the sad element in the case that deceased by her work was assisting in the maintenance of her crippled husband and children.—A verdict of "Accidental death" was returned.

The American Blower Company, 70, Gracechurch Street, London, invite all interested in brick drying to inspect the A.B.C. brick dryers in operation. Plants can be seen in all parts of the United Kingdom and Continent, but several of the latest are within easy reach of London.

Memorial Portrait of the late Sir Henry Doulton.—On May 29th there was a large gathering at the Wedgwood Institute, Burslem, to witness the unveiling of memorial portraits of the late Sir Henry Doulton and Dr. John Alcock. The portrait of Sir Henry had been painted by Mr. Ellis Roberts, a former student of the Institute art classes and Stoke School of Art, and was a tribute to the memory of their employer by the workpeople of Messrs. Doulton and Co., of Burslem. Amongst those present were Mr. W. Woodall, M.P., Alderman W. Bratt (mayor), and a number of manufacturers. A letter of apology for absence was received from Mr. H. L. Doulton, who expressed appreciation of the kindness of the workmen, and gratification that the committee of the Wedgwood Institute had consented to place the portrait of his father in so important an Institution. The portrait of Sir Henry Doulton was unveiled by Mr. J. C. Bailey (manager of the firm's Burslem works), and that of Dr. Alcock by Mr. W. W. Dobson. Both portraits were presented to the Mayor as representing the town, and his Worship asked Mr. Woodall, M.P., to accept them on behalf of the Wedgwood Institute Committee, who will act as custodians of them on behalf of the inhabitants.—In accepting the memorials, Mr. Woodall said that no more agreeable task could have been placed upon him, and no more agreeable privilege conferred upon the committee of which he was chairman, than to be the recipients of these gifts. Of Sir Henry Doulton, he might be permitted to say that no one—not even excepting Josiah Wedgwood—ever displayed such gifts of administrative enterprise as those which he brought to bear in the development and extension of a world-wide and, he was glad to know, prosperous business. It happened in recent years that he had had the pleasure of being associated with Sir Henry in connection with one of the very many enterprises in which he brought to bear his philanthropic and business capacity in providing pensions and assistance to those engaged in the pottery and glass trades, in respect of which he gave an amount of time and personal attention which greatly impressed him.

London Improvements.—A list of six improvements, estimated to cost £1,565,000, has been before the London County Council. This list has been prepared by the Improvements Committee, and they recommend that Parliamentary powers should be sought next session. The first relates to the extension of the Thames Embankment between the Houses of Parliament and Lambeth Bridge, and the improvement of the district near Millbank. It is proposed that the course of Abingdon Street and Millbank Street shall be altered, and a new street 70ft. wide be formed. By the recoupment resulting from the alteration of the line of Millbank Street, and from the acquisition of the property between the street and St. John's Church, it will, in the opinion of the committee, be possible to embank the river, to extend the Victoria Tower Garden, to widen Millbank Street, and to widen the other streets up to St. John's Church, including a portion of Horseferry Road, at a cost of £530,000, as compared with £306,000 for the imperfect and unsatisfactory scheme of merely widening the existing Millbank Street, and £498,000 for both widening and straightening the street. The second scheme is for the much needed widening of Mare Street, Hackney, to 70ft. wide, between the North London Railway and the Triangle. The total net cost is £577,100. The third scheme is to widen Goswell Road to 60ft. between Upper Ashby Street and Great Sutton Street at a net cost of £209,500. The widening of Nine Elms Lane to a maximum of 60ft. is the fourth suggested improvement. This is to be between Southampton Street West and Battersea Park Road, and the net cost of the scheme is £136,400. The fifth project concerns Camberwell Road, which is to be widened between Warner Road and Camberwell Green at a net cost of £52,000. The last improvement on the list is a small widening of Kentish Town Road.

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No. 7a Brickmaking Machine by Whitehead, with rolls overhead, and hoisting gear, cutting-off tables, &c., complete.

Two No. 7 Horizontal Machines by Whitehead, with crushing rolls, dies and cutting-off tables complete.

Large Screw Quarry Press by Pullan and Mann.

One nearly new powerful Machine by Sampson & Sons, two pairs of top rolls, one plain and the other corrugated, all complete for an output of 20/25,000 per day.

Two Gill's Patent Presses, one with engine.

"Eclipse All" Brickmaking Machine by Scholefield, with press and mixer complete.

Portable Brickmaking Machine by Bedford Iron Co., horizontal pug, mouthpiece, die, and cutting-off table, complete.

Set Ditto Ditto, rolls, 34 in. × 18¾ in.

Set Expression Rolls, gearing, housings, mouthpiece, &c., all complete.

Vertical Pug Mill, all iron, for steam power.

Several sets Hoisting Gear.

Clayton, Howlett & Co.'s A3 Horizontal Machine, thoroughly overhauled, rolls 30in. long, 20in. diameter, die and table complete.

Bawden's Pugging and Moulding Machine, for Horse or Steam Power.

Scholefield's Semi-Dry Machine and Press, complete.

Johnson's Horiz. Machine, with two pairs of rolls, massive throughout, complete, practically new.

Set Crushing Rolls, 24in. by 18in., complete for work.

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No. 4 Hand Power Pipe and Tile Machine, Bedford Iron Co. type, complete with cutting-off table.

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Several Vertical Pug Mills for animal power.

Brickmaking Machine, consisting of vertical pugmill, die, and cutting-off table, for animal power.

Improved Hand Brick Press, with screw action from below.

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5 ft. 6 in. Under-driven Pan, rolls 2 ft. 6 in. diam., by Mason Bros.

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9 ft. Perforated Pan, complete, and in excellent order; over-driven.

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Hand, Horse Power, and Steam Pumps.

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Complete Brickyard Plants Estimated for.

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The "MANCHESTER" Continuous Kiln.

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This Kiln is superior to all others for Burning High-class Facings and Moulded Bricks, Terra-Cotta, Chimney Pots, Tiles, Quarries and other articles.

PRACTICAL MEN state it to be the only Continuous Kiln which has been known to turn out really High-class Goods, superior to any Down-draught Kiln (see Testimonial below).

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Far ahead of all others for the thorough drying of the goods whereby the finest colour is ensured. Green Bricks can be set as soon as they are hard enough for piling, and will come out of the kiln (after being treated with our hot-air drying system) of a beautiful tint, without any stain, and ***absolutely free from Loss or Waste.***

Our arrangement for the outlet of all steam and vapour from each chamber is altogether the most scientific in principle and effective in working that has been adopted in any kiln that has ever been erected on the continuous system. In **all other** continuous kilns the steam has to travel the whole length of the chamber **through all the goods** before it can get away: this very serious defect is entirely overcome in the "Manchester Kiln."

This kiln effects an economy in fuel of from 50 to 80 per cent. on any ordinary up and down-draught kiln. Our system insures perfect combustion, as may be seen from entire absence of smoke from chimney.

TESTIMONIAL.

THE REDHILL BANK BRICKWORKS, ROCESTER, STAFFS.,
May 27th, 1899.

DEAR SIRS,—We have great pleasure in bearing testimony to the satisfactory working of the "Manchester Kiln" for the time we have had it in use, which is about nine months. The saving in fuel, as against the ordinary down-draught kiln, is a wonderful item. The goods come out a deal better in colour, and I may say are giving great satisfaction to our customers everywhere they go.

Yours truly,
A. HEWINS.

Messrs. DEAN, HETHERINGTON & Co.

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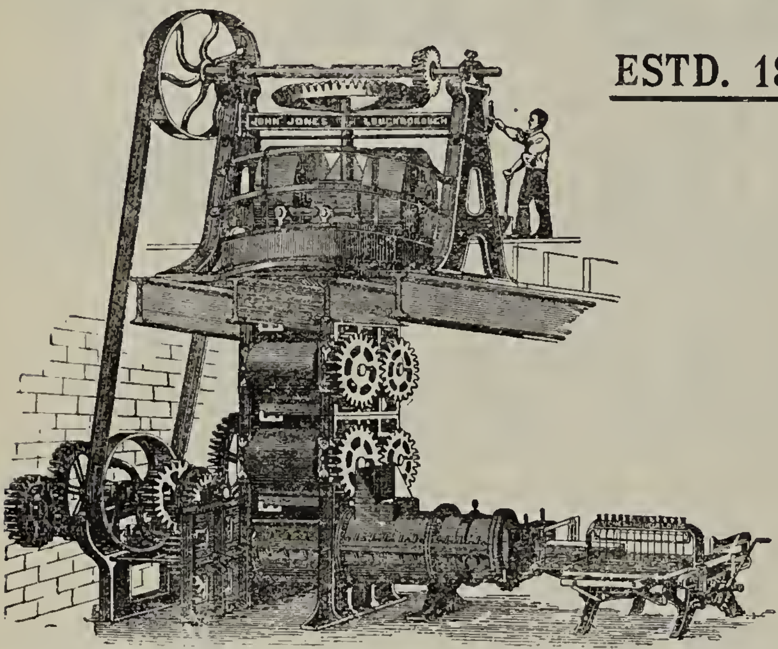

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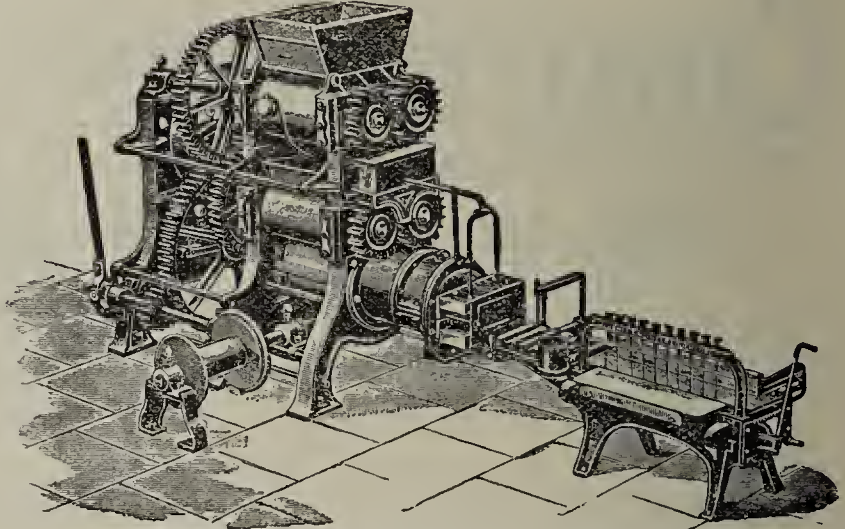

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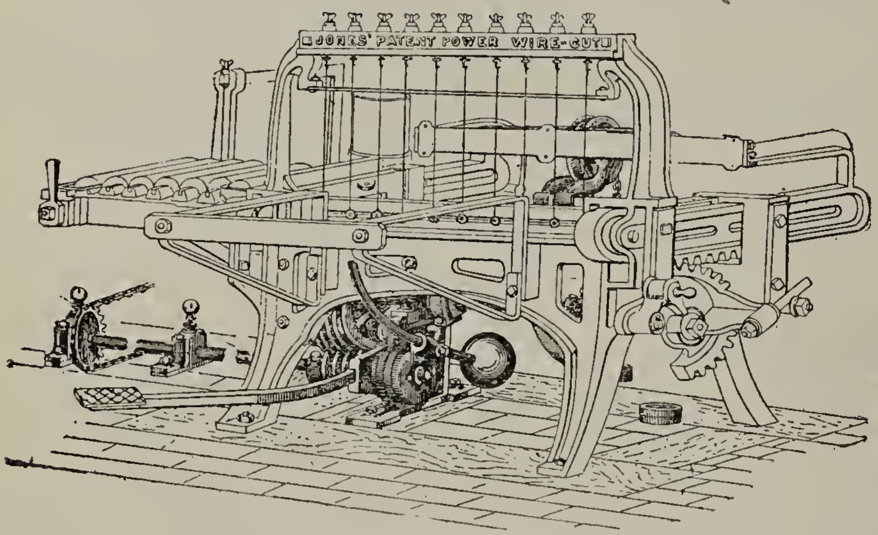

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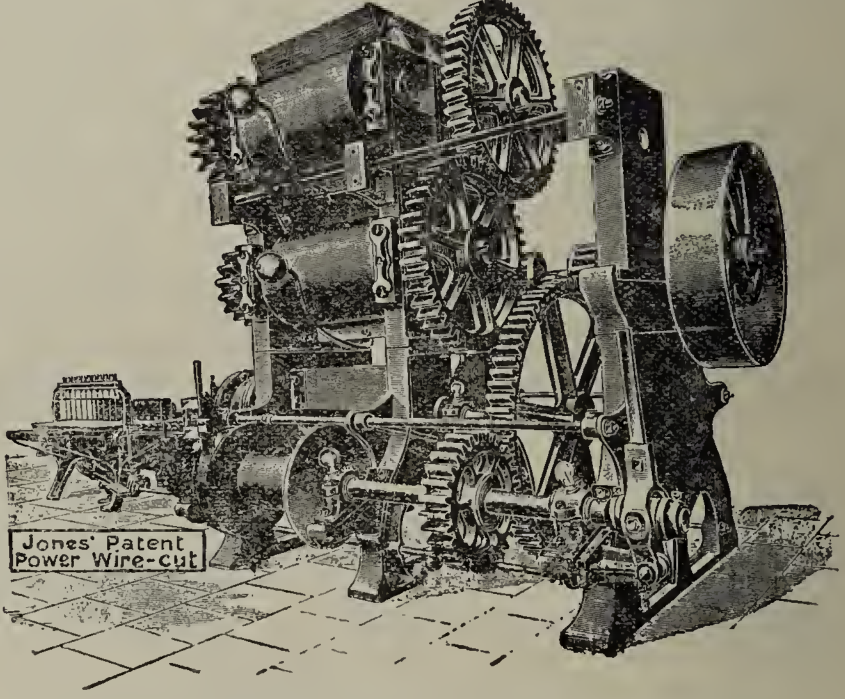
Our Patent Power Attachment can be applied to your present Wire-cut, and saves a man at the handle end



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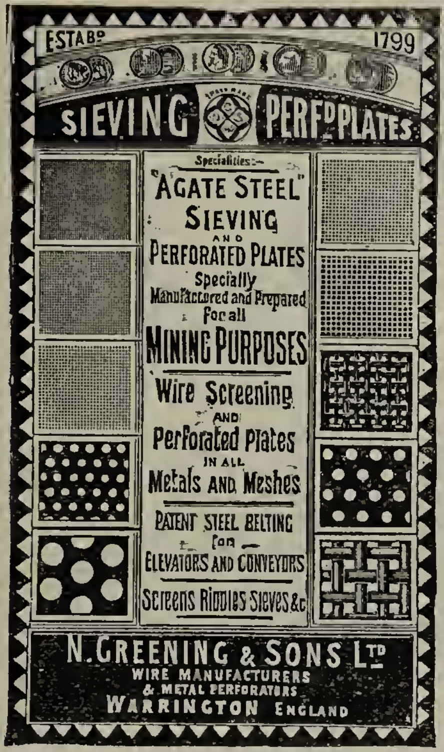
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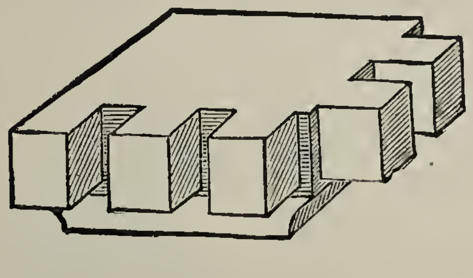

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NEW COMPANIES.

Carnells, Limited.—Capital £10,000, in £1 shares (£4,000 preference). Object, to acquire the business carried on as Carnell and Co., at Enfield, Middlesex, and to carry on the business of builders, brick and tile manufacturers, &c. The first directors—to number not less than two nor more than five—are H. K. Bridger, A. Armfield, and H. W. Carnell. Qualification, £50. Remuneration £300 per annum, divisible. Registered office: 5, Central Buildings, Lancaster Road, Enfield.

West Australian Collieries and Fireclay Company, Limited.—Capital £150,000, in £1 shares. To adopt an agreement with the Boulder Consolidated Investment Corporation, Limited, and to carry on the business of coalmasters, brick, pipe, and tile makers, &c. The number of directors is to be not less than three nor more than seven; the subscribers are to appoint the first. Qualification, 200 shares. Remuneration, £250 each per annum—£350 for the chairman—and a share in the profits.

The Plotcock Brick and Minerals Company, Limited.—Capital £50,000, in £1 shares, to adopt an agreement with the Millbeugh Colliery (Limited). Signatories:—Robert Stewart, contractor, and G S. Lindsay, clerk, 112, West Graham Street, Glasgow; Thos. Reid, merchant, 160, North Street, Glasgow; Robt. Grant, coalmaster, Larkhall; Alex. Morrison, 196, St. Vincent Street, Glasgow; W. Stewart, writer, 100, West Regent Street, Glasgow; and Alex. Allan, accountant, 48, West Regent Street, Glasgow.

Newport Pottery Co., Ltd.—Capital £5,000, in £1 shares, to acquire and carry on the business of potters and brick and tile manufacturers, carried on at the Crindau Pottery, Newport, Mon., and to adopt an agreement with W. Price and J. Rogers. The number of directors is not to be less than two nor more than five; the first are S. Dean, A. T. Price, C D. Price, J. Rogers, and H. A. T. Skyrme; remuneration as fixed by the Company. J. Rogers is the managing director with £50 per annum and 7½ per cent. of the net profit.

London and Brighton Brick, Tile and Terra-cotta Company, Limited.—Capital £50,000, in £100 shares. To carry on business as brick, tile, pottery, pipe, and terra-cotta makers, &c. The signatories are:—

	Shares.
H. Partridge, Castle Hill, Bletchingley, Surrey...	50
H. O. Barclay, Bletchingley	50
F. H. Barclay, The Warren, Cromer, Norfolk...	50
R. L. Barclay, 54, Lombard Street	20
E. E. Barclay, Brent, Pelham Hall, Herts	25
C. C. Macrae, 4, Bank Buildings, E.C. ...	50
H. G. Barclay, Colney Hall, Norwich ...	1

The first directors—of whom there shall be not less than three nor more than five—are to be elected by the signatories. Qualification. £250. Remuneration to be fixed by the company.

W. N. Bundy, Limited.—Capital £10,000 in £10 shares, to acquire and carry on the business of a brick and tile manufacturer at Whittlesea. The first directors—to number not less than two or more than three—are W. N. Bundy and H. N. Bundy. Qualification, £20. Remuneration as the company may decide. Registered office: Lattersey Field, Whittlesea.

Standard Cement Syndicate, Limited.—Capital £15,000, in £1 shares. To enter into an agreement with J. Routh, and to carry on in the Isle of Wight and elsewhere the business of cement manufacturers, &c. The first directors—to number not less than three nor more than five—are to be nominated by the subscribers. Qualification, £250. Remuneration, £70 each per annum.

A. H. Lavers, Limited.—Capital, £25,000 in £10 shares, to acquire and carry on the business of a whiting manufacturer, and brick, cement and builders' material merchant, carried on by A. H. Lavers at Lavers' Wharf, Nine Elms, S.W. A. H. Lavers is the governing director, with £500 per annum. Qualification, £500. Remuneration of ordinary directors (if any), £600 per annum, divisible. Registered office, Lavers' Wharf, Nine Elms, Surrey.

Greenfield Coal & Brick Co., Ltd., Shettleston, near Glasgow.—Promoted with a capital of £15,000, in £1 shares, to take over from Thomas Spittal, contractor of Shettleston, Glasgow, his business of colliery proprietor and brickmaker.

Hedingham Brick Company, Limited.—Registered by E. S. Beard, Headgate, Colchester, with a capital of £25,000, in £1 shares. To acquire and carry on the business of a brick, tile, and drain pipe manufacturer carried on by E. West as the Purls Hill Brick Company at Great Maplestead and Sible Hedingham, both in Essex. The first directors, to number not less than three nor more than five, are E. S. Beard, G. Comer, and W. H. King. Qualification £100. Registered office: Headgate, Colchester.

Burnyeat, Brown and Company, Limited, Leeds.—Capital £120,000 in £10 shares. To enter into an agreement with a company of the same name, to acquire mines, quarries, and to deal in clay and any other minerals.

South Berks Brick, Tile and Pottery Company, Limited, Reading.—Capital £50,000 in £1 shares. To adopt an agreement for the acquisition of the business of brick and tile manufacturers as now carried on by the Shaw Kilns Company, Limited, and to develop and extend the same. The first directors—of whom there shall be not less than three nor more than seven—are J. Rankin, W. and T. McIlroy, and J. Winter. Qualification, £50. Remuneration, £175 per annum, divisible.

Madeley Heath Brick and Tile Company, Limited.—Capital £5,000 in £1 shares. Object, to acquire and carry on the business of the Madeley Heath Brick and Tile Company, of Madeley, Stafford. The first directors—to number not less than three nor more than five—are H. E. Emery, J. M. Turner, and W. Savage. Qualification, £400. Remuneration £150 per annum, divisible. Registered office: Little Madeley, near Newcastle-under-Lyme, Staffordshire.

Black Hill Brick and Terra-Cotta Company, Limited.—Capital £15,000 in £10 shares. To acquire certain lands at Black Hill, Entwistle, Lancashire, to adopt an agreement, and as manufacturers of red facing bricks, pipes, tiles, &c. The first directors—to number not less than three nor more than seven—are W. J. E. Salt, W. Bretherton, J. Ollerton, R. Platt, and N. Rushton. Qualification £250. Remuneration as fixed by the company. Registered office: 10, Carrington Road, Chorley, Lancashire.

Everton Timber Company, Limited.—Capital £2,000, in £1 shares, to carry on the business of timber merchants, brick and tile manufacturers, and property brokers. Registered without articles of association.

South Derbyshire Land & Building Co., Ltd.—Capital £10,000, in £10 shares. To acquire lands and prepare the same for building purposes, and to carry on the business of builders and dealers in bricks, &c.

Ten Coal, Iron & Brick Co., Ltd.—Capital £10,000, in £1 shares. To acquire and carry on the businesses carried on at Chester as the Ten Coal Exchange Co. and the Cestrian Brick & Tile Co., and to enter into an agreement with U. Bromley, G. Bromley, C. Evans, and E. E. Evans. Registered without articles of association.

New Globe Cement, Chalk & Whiting Co., Ltd.—Capital £150,000, in £1 shares. To adopt an agreement made between J. B. Fielding and this Company for the acquisition of the business of whiting manufacturers as now carried on by the Globe Portland Cement & Whiting Co., Ltd., and of property at Greenhithe, and to carry on business as manufacturers of cements, lime, bricks, tiles, pipes, &c. The directors—to number not less two nor more than five—are to be elected by the signatories. Qualification, £250. Remuneration, ordinary directors, £150 per annum each; chairman, £200—to be increased according to profit.

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SITUATIONS WANTED.

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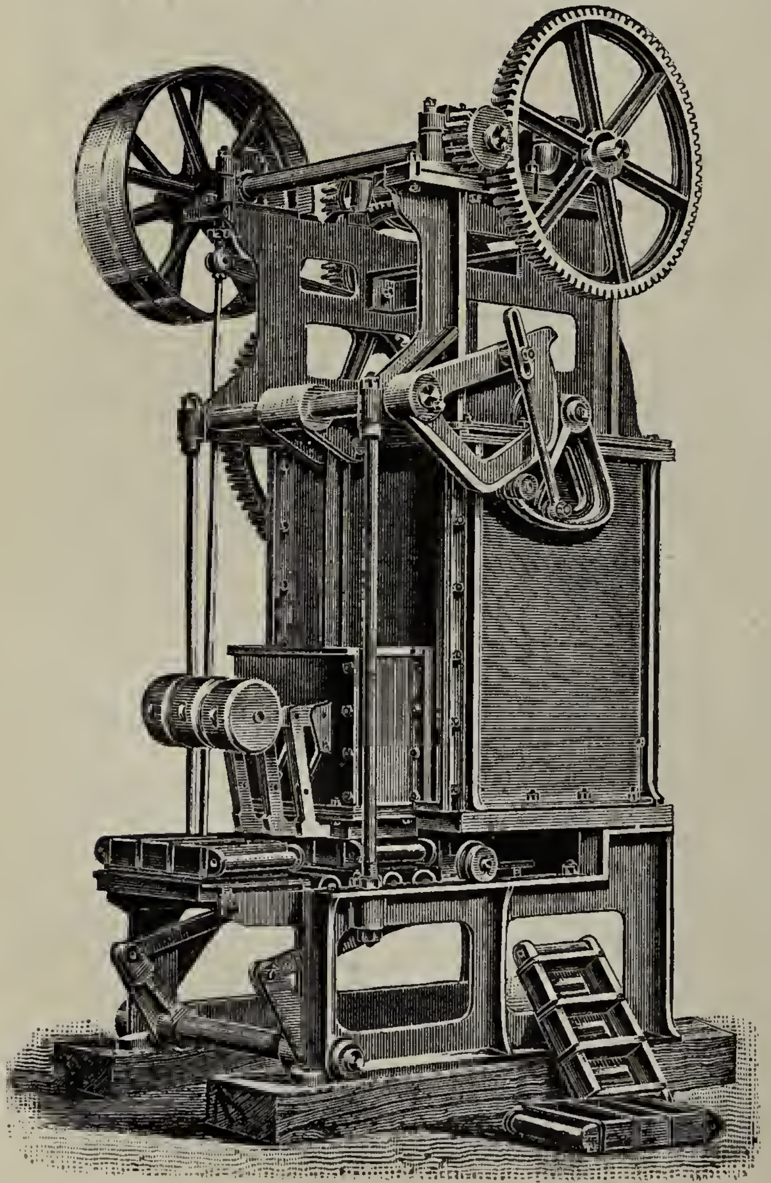

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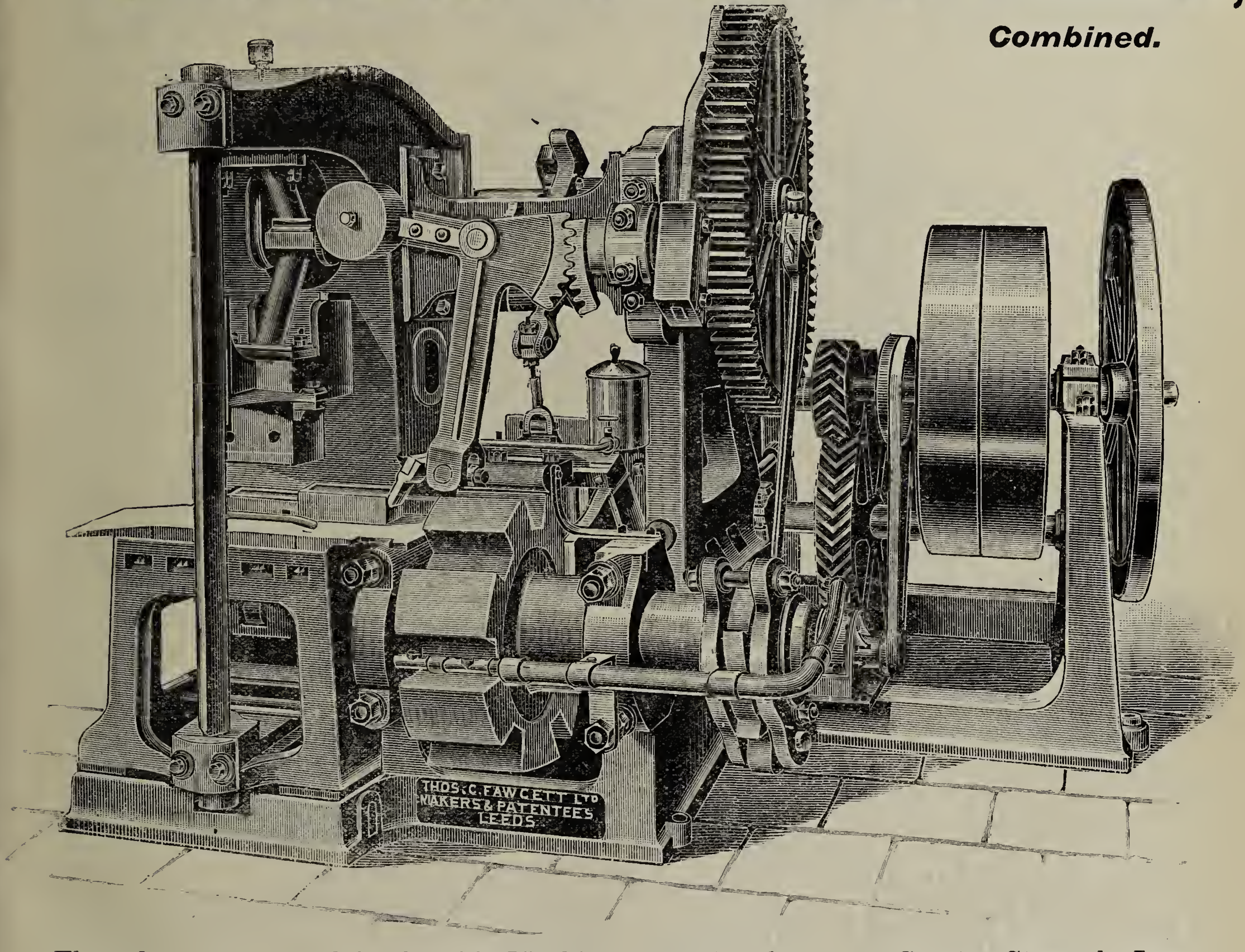

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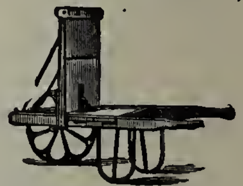

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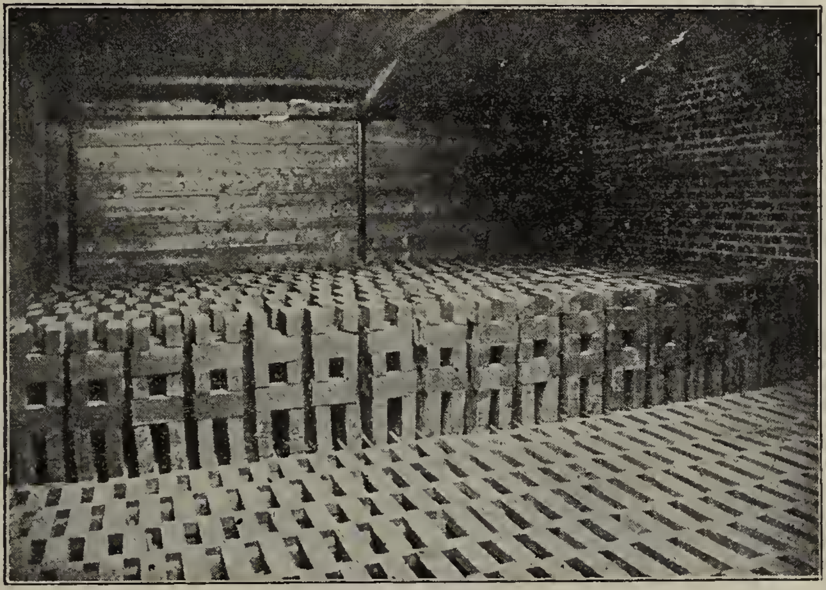

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"THE BRICKBUILDER" (Supplement) :—
Notes by F.R.I.B.A.
The Manufacture of Majolica—VI. and VII.
Death of Professor Banister Fletcher.

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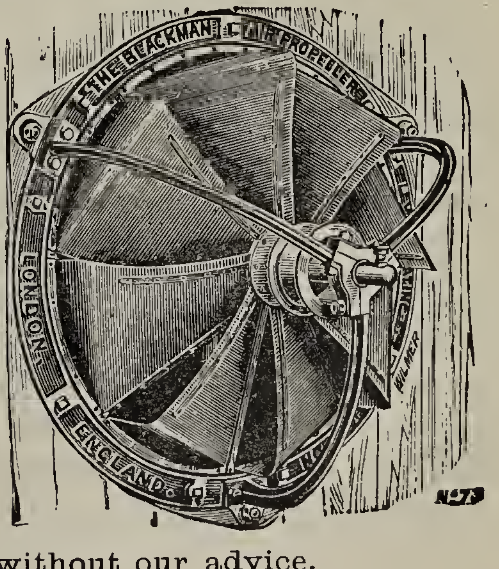

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BY THE WAY.

We hope that all our readers who believe in co-operation, and are proud of their trade, will read the remarks in another column concerning the British Clayworkers' Mutual Insurance Corporation. It is difficult to understand why every clayworker in this country—and there is not one who does not read this journal—should hesitate to place his insurance with his own Company. We are almost tired of drumming into our readers the simple fact that a man cannot pay too high a premium in this Company, considering that its profits are shared, and he might just as well do this and rest content, as deal with other offices who fall from high prices to low ones and jump up again to high ones, and make all sorts of ridiculous quotations without knowing one little bit where they stand!

* * *

We hear a great deal of Delagoa just now, and it is interesting to learn the opinion of the British Consul at that place as regards trade. He thinks that we are all behindhand with our exports because we will not push business there. "Cement," he says, "cheaper principally on account of the lowness of freight, is imported from Germany. The best brands of German cement are said to be as good as British. Bricks and roofing tiles from France are cheaper than those from Great Britain; floor tiles come from Portugal and France." Fortunately most of our brick and tile and cement manufacturers have more than they can do to supply home customers just now—but the time may come.

* * *

More than passing interest attaches to the death, at Ballarat, of Mr. James Hart, who at one time was a Surveyor at Castlemaine. He claimed to be the inventor of the first brick-making machine, and for this received a gold medal and a bonus of £1,000 at the London Exhibition of 1851. He was 94 years of age.

* * *

A special commissioner of the "Spalding Free Press" has been telling its readers the wonderful story of Peterborough and its development, and of the fortunes made there during the past few years. From it we learn that the claypits of Fletton are worth more than Canadian or South African mines, and that all the fortunate owners of land are embryo millionaires, with possible peerages and houses in Park Lane well within view.

* * *

Walking from Whittlesey to Peterborough, he says, one may count as many as eighty shafts, nearly all of which tower above the local churches be they as high as that of Louth or Spalding. The entire district is conveniently divided into sub-districts. Farcet, a Fenland village, is the centre of the industry. There are sixteen brick companies, having "claims" extending from Fletton to Yaxley Station, on the G.N.R. main line. These companies own at present about two dozen yards, and others are being established. The next most important extension is at Whittlesey. Here a gigantic enterprise is in the hands of Mr. A. W. Itter. The Saxon Brick Company is continually developing just over the way, and another prosperous concern is run in connection with the well-known name of Bundy. At Eye there are two companies, and at Warboys, near Ramsey, a brickyard. There are yards, too, at Dogsthorpe, on the outskirts of Peterborough, while the Norman Cross clays are now being opened up. The newest company is the Fletton Crown Co., Farcet. Throughout this extensive district the brick-earth is all of the same stratum, but at different places the quality varies.

* * *

The majority of the brick-making concerns are run by syndicates and companies, the notable exception being that controlled solely by Mr. Itter, of Whittlesey. Mr. Itter said, in conversation, that he would not take £150,000 for his earthy possessions at Whittlesey. A few years ago he was but a poor mechanical engineer. Messrs. George Keeble and A. J. Keeble—names well known throughout South Lincolnshire—are practically the New Peterborough Brick Company, another successful concern, capable of turning out 100 trucks per day.

* * *

The most extraordinary access of wealth to any one man in connection with the industry, has been in the case of Mr. J. C. Hill. He started in a London builder's yard as a plain ranker in his craft, and at a wage of 9d. per hour. During his first nine months he saved £50. Being gifted with more than ordinary native shrewdness and enterprise, he rapidly became master-man and contractor. Ten years ago he added brickmaking to his building business. To-day he is the sole partner in that gigantic firm, the London Brick Company, and has works at Peterborough, Enfield, and Great Bentley, Essex. Altogether 1,500 men are employed, and his wages' bill amounts to over £3,000 per week.

* * *

When Mr. Hill bought 1,200 acres of rural land in the neighbourhood of Peterborough, the extent of its sub-loamian wealth was scarcely suspected; now he estimates its value at, at least £200,000. At Enfield there are 80 acres valued at £30,000, and in Essex 70 acres. For the Great Central Railway, recently opened, Mr. Hill provided no fewer than 25,000,000 bricks, and his Peterborough yards alone are capable of turning out 110 trucks in one day. Each truck contains 3,000 bricks, making a total number of 330,000 bricks per day. It is estimated that the daily output from the whole of the yards which skirt the G.N. main line is about 350 trucks, or 1,050,000 bricks. The average price obtaining to-day in the Fletton yards for semi-dry building bricks is from 23s. to 24s. per thousand, the rise having been about 1s. per thousand since Christmas. London receives the bulk of the bricks. It is safe to say that there is a clear profit to the companies of at least 5s. per thousand bricks. Thus, with such an enormous output, it is easy to account for the huge fortunes which have been so rapidly made.

* * *

The development of brickmaking has caused a small Johannesburg to spring up on the outskirts of the borough of Peterborough. It has created the necessity for a sewage system on a scale similar to that adopted by big cities. There are new schools, coffee houses, and other institutions, while a company floated by Keeble Brothers will shortly run an opera house, in a great measure for the convenience of brickyard operatives. Mr. Hill has recently put a contract in hand for the building of one thousand workmen's cottages required by his own employees, and houses are being erected, whole streets at a time. Like Dominie Sampson one can only murmur—Pro-di-gi-ous!

THE BRICK-EARTHS OF GREAT BRITAIN.—XXIV.

PETERBOROUGH AND DISTRICT.

THE district of Peterborough is second to none in the Kingdom in its interest to the brickmaker. We have watched the brickmaking industry of Fletton for many years, and that together with some other excellent localities have been making rapid strides. No wonder, when there is such a superabundance of good material for brickmaking, and convenient carriage is so near at hand. All the same, whilst our friends at Fletton are undoubtedly wide awake, it is doubtful whether even they have an adequate idea of the enormous masses of different kinds of brick-earths lying almost at their doors. They have become so accustomed to the never-failing blue-black Oxford clay that few have ventured far from their own doors to search for material for other kinds of bricks than those normally made near Peterborough. Our sketch map (FIG. 1) gives a general scheme of the distribution of rocks in the neighbourhood, and it will be well to take these horizons in detail and to point out where these other suitable earths are, as well as to shew the surface extent of the clay last alluded to.

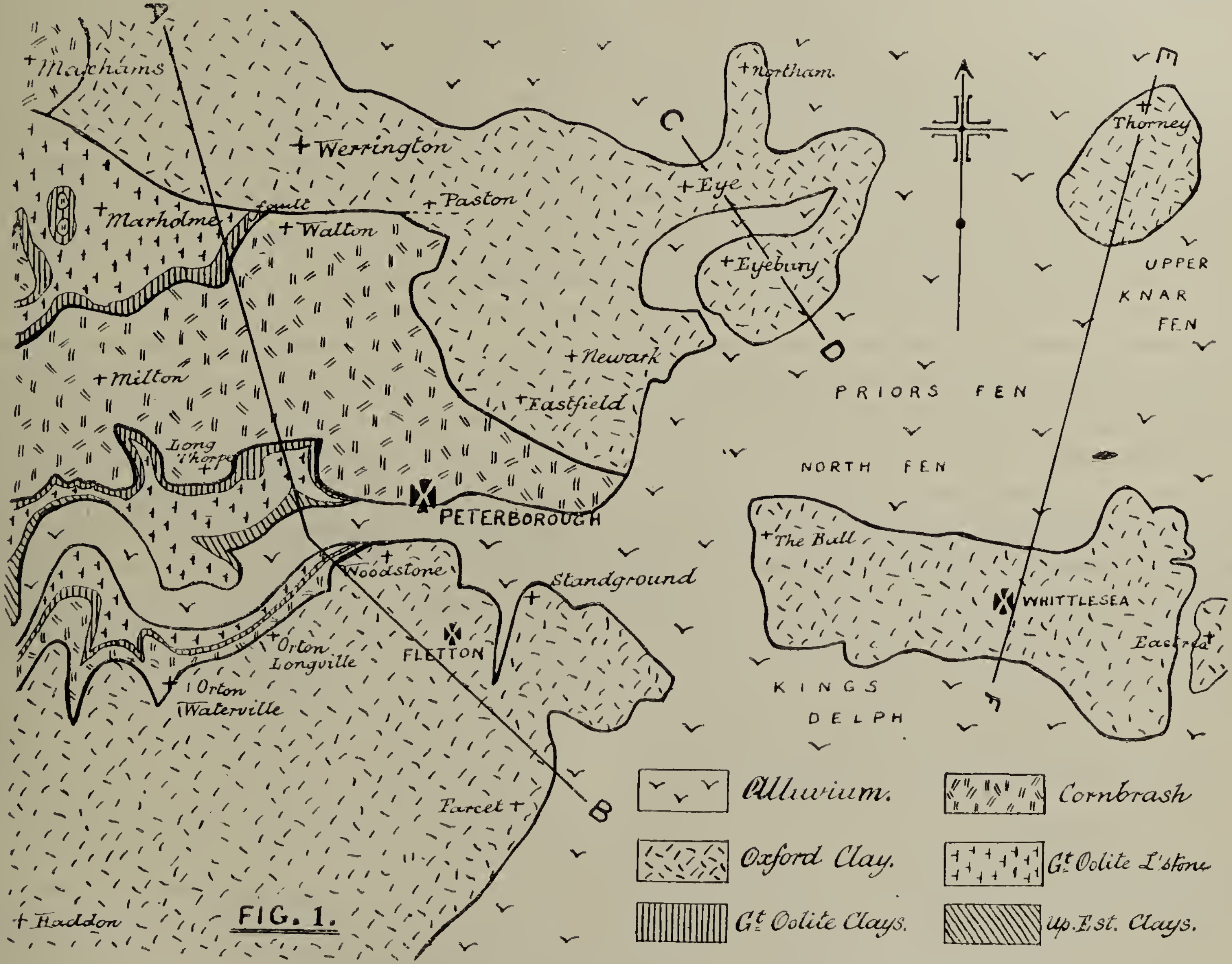


Fig. 1.—Sketch Map shewing Brick-earths, &c., in the Peterborough District.

To begin with, let us say a few words respecting that denoted "alluvium" on the map. That deposit is well spread (as will be noticed) in the east of the district, and an arm of it, running up the valley of the river by Peterborough, cuts our area into two parts. This "alluvium" is also known as the "Fen" deposit, and is exceedingly variable in character when traced over wide areas. There is an alluvial deposit specially characteristic of the fen meeres, fen silt, peat and gravel. Although suitable in part for brickmaking we need not wonder that it is practically neglected in consequence of the near proximity of the more substantial "solid" deposits to be presently described.

Our map, based as usual on the official government survey, is purposedly denuded of glacial* and mid-glacial beds which form a superficial mantle over a part of the area, especially in the neighbourhood of Overton (or Orton) to the west of Peterborough. Speaking in general terms the glacial beds consist of a thin boulder clay, gravels, and sand at base. The other pleistocene beds beneath the sands are, in descending order, pebble gravels, sands, old valley gravels, and brick-earth. None except the last-mentioned are of much use to the brickmaker, though the sands may be utilised when the Oxford and other marine clays are too stiff.

---

* See chapters on Essex and Suffolk as to this term.

Turning to the Oxford clay, which, as we have seen, is *the* brick-earth of the district, it will be well to point out its limits. There is an outcrop several square miles in area to the north, north-west and north-east of Peterborough, as at Eye, Eyebury, Newark, Dodsthorpe, Werrington, Glinton, and Peakirk. An outlier about 1½ square miles in area lies to the east at Thorney, and a very much larger one at Whittlesea, near which place bricks have been made for many years. The great mass of Oxford clay, however, lies to the south of Peterborough, stretching far beyond the southern limits of our map. It is in the northern part of this great patch that Fletton stands, and not far away are Stanground, Woodstone, Overton (or Orton) Longville, Overton (or Orton) Waterville, and a mile or two to the south of Fletton we come upon Farcet, and farther on Yaxley. There are so many places where good bricks are made in the vicinity that we will not attempt to enumerate them, in fact the whole of the Oxford clay alluded to is dotted over with brickyards, more particularly in the vicinity of the railways.

The Oxford clay, which is very constant as a fairly stiff clay, in the middle and upper parts of the formation, has a series of sands, sandstones and clays at the base known as the Kellaways beds. These beds are dug for brickmaking amongst other places at Dogsthorpe (or Dodsthorpe), where, according to Professor Judd, the sections exhibit light and dark blue clays, often mottled, becoming in some places very sandy, and passing in others into light brown sands which are somewhat indurated. The sandy rock here does not appear to form regular beds in the clay, but to constitute nests and irregular lenticular masses. Continued lower, as proved by an experimental boring, there are soil and gravel 3 ft., sandy clay with stony bands 8 ft., hard blue "dicey" clay 7 ft., under which the Cornbrash (see map) was touched. The bricks made from these sandy clays are said to withstand a considerable degree of heat. The sandy nature of these deposits gives a peculiar character to the soil weathered from them, causing it to exhibit a whitish colour and a dryness very different from that of the stiff Oxford clay above.

At Stanground, Woodstone, Fletton and vicinity, dark blue clays are the normal brick-earth, and they are noted as containing much fossil wood and saurian remains. Many of the most interesting Secondary reptilia found in Europe come from here and from Eyebury, and all palæontologists are indebted to Mr. Leeds, of Peterborough, for the great care he has taken in collecting them for many years. The specimens found include many of the gems in our national collection, in the Natural History Museum, at South Kensington. Professor Judd remarks that the very large quantities of wood, either converted into jet or mineralised by pyrites, is a specially noteworthy circumstance at these localities.

At Werrington, brickyards exhibit beds of Oxford clay overlaid by thick masses of Boulder clay, with gravel at base; and most of the Oxford clay is hidden hereabouts and to the northward by these superficial deposits.

About eight miles south of Peterborough, at Holme, laminated blue shales crowded with fossils are worked, and a similar deposit of Oxfordian age has been drawn upon at Haddon. The brickyards at Corrington shew the characteristic stiff blue clays, and the same beds are developed between that place and Holme, and to the south at Sawtry. Some eight miles to the east of the last-mentioned place is Ramsey and Bury. The Oxford clay here crops out in large outliers, flanked by the ordinary fen deposits already described in this article. The clay is locally termed "galt," which may account for some people imagining that gault bricks (*i.e.*, bricks made from the clays of the Gault formation) are made here. At Ramsey Heights the bricks used to be burnt with peat.

In the neighbourhood of Whittlesea (see map) are many brickyards, some of which have been open for years. The clay is there deep blue in colour, and contains much pyrites and wood. Near Eye, Eyebury and Eye Green are many yards; at the latter place a thin ferruginous stony seam occurs in the midst of the Oxford clay. In the outlier at Thorney the formation has been dug to a considerable depth.

Before proceeding to describe the other horizons shewn on the sketch map (Fig. 1) let us examine the sections (Figs. 2, 3 and 4).

The section Fig. 2 shews that near Marholme the strata are dislocated, the Oxford clay being faulted against the Great Oolite Limestone, the whole of the succeeding formations sharing in the disturbance. Near Peterborough (see Woodstone) the river has cut down into the Upper Estuarine clays, so that it is not difficult to make out the succession on the slopes of the undulation or hill. The reader will know that in order to present such a section within a reasonable compass the vertical scale is greatly exaggerated. Thus, it would appear from the section that quite substantial hills occur at Milton and Fletton, whereas they are mere undulations in fact, the ground being fairly flat. Similarly, the strata are made to be more highly inclined under Fletton than they actually are in nature. That is in consequence of the *British Clayworker* not being, say, half-a-dozen yards in width, or from the circumstance that we do

FIG. 2.

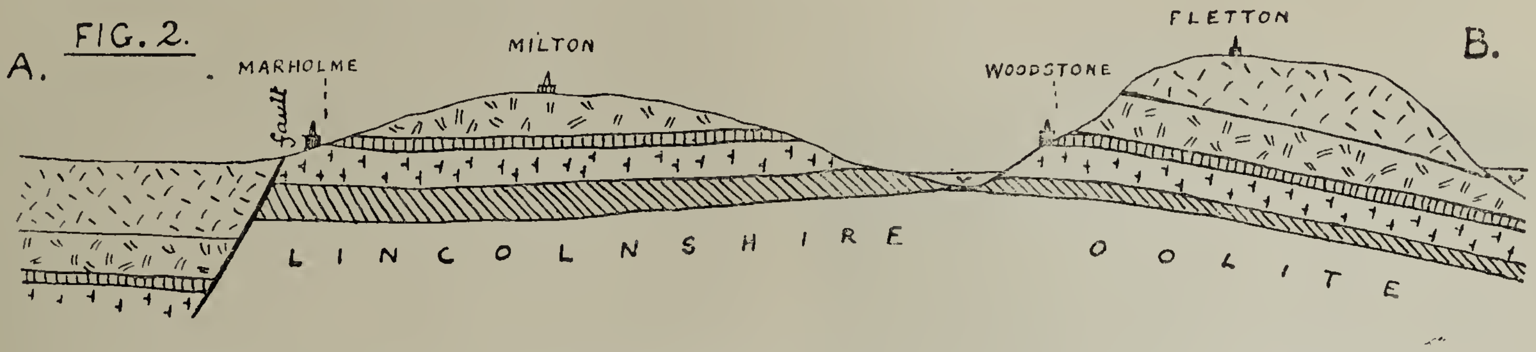


FIG. 3.

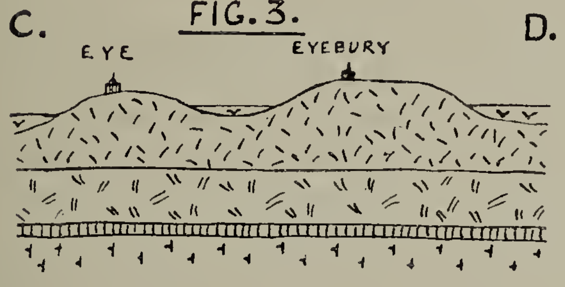
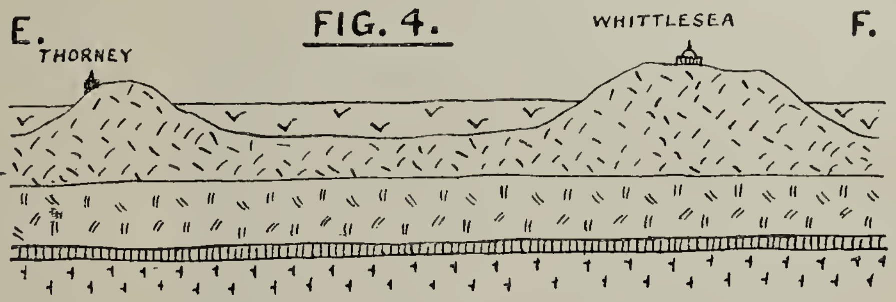


FIG. 4.



Figs. 2, 3 and 4.—Sections along the Lines A B, C D, and E F, respectively, in Fig. 1.
(N.B.—The symbols are the same as those employed in Fig. 1.)

not send out microscopes with this journal. All that can possibly be aimed at is to give a clear section which can be readily understood. Fig. 3 serves to show that whilst the Oxford clay is so much covered in the vicinity of Eye and Eyebury by the fen deposits, the clay is not far beneath and can be readily found by sinking through the alluvium. Whether that would pay depends on the locality, and especially on the water level, which in the fen districts is practically near the surface of the ground. The section in Fig. 4 indicates a similar phenomenon, showing the continuity of the Oxfordian from the other at Thorney to that at Whittlesea, only in this case the fen deposits are thicker between.

The clays of the great Oolite series next claim our attention. They are not well developed in the Peterborough area, but occur to the west of the town on the north side of the valley as near Long Thorpe, and to the south of the valley from the vicinity of Woodstone by the Overtons, as a thin strip (outcrop) westwards. The geological survey remarks that these clays are variegated, blue, green, yellow, and purplish in colour, often containing bands of irregular whitish or pale green calcareous concretions, and, not infrequently, ironstone in the form of septaria, or in branch-like concretions. Their maximum thickness is about 30 feet, but they are much less in our district. At New England, near Peterborough, and at Bedford Purlieus these clays have been much dug for brickmaking, but the beds are seldom of economic value. Neglecting the Cornbrash and the great Oolite limestone (see map) as they are of little or no use for our purposes, we come to the lowest bed shewn, the Upper Estuarine clays. These are occasionally very sandy, of various colours, light blue predominating. Interstratified with the clays are bands of sandy stone and shell layers. Calcareous concretions and bands of fibrous calcium carbonate frequently occur. The lower part of the series often consists of white clays passing into sands. At the base of the series there is always a thin band of nodular ironstone. The maximum thickness of the whole is about 30 ft. The clays are excellent for brickmaking, for which purpose they are dug at many places to be described in other articles of this series; but they do not appear to have attracted the attention of Peterborough brickmakers, so far as we are aware. Indeed, in some parts an excellent terra-cotta is made of these Upper Estuarine clays.

ROYAL SHOW AT MAIDSTONE.

The Royal Show at Maidstone, which opened on the 19th ult., did not offer many attractions to clayworkers. Year by year the popularity of the Royal Show as a *rendezvous* for brickmakers gives place to the Building Trades' Exhibition in London. Only one brick machine manufacturer was in evidence at Maidstone—Mr. T. C. Fawcett, whose exhibits were similar to those described in our last issue. The same may be said of the Blackman Ventilating Co., Ltd. Messrs. Ruston, Proctor & Co., of Lincoln, showed their portable engine 8 h.p. new type, and an oil engine of about the same capacity, specially suitable for brickyard work.

Among the clayworking exhibits we noticed the stands of Messrs. H. J. and C. Major, of Bridgwater; The Somerset Trading Co., Bridgwater; The Weston-super-Mare Pottery Co., Ltd.; Messrs. Foster and Tidman, Wisbech; and Messrs. Oates and Green, Ltd., Halifax. Most of these firms were also represented at the Building Trades' Exhibition, and mentioned in our May issue.

THE USE OF QUARTZ IN CLAY WORKING.

By the term "quartz" we do not confine ourselves to that material which would be known to the mineralogist under that name, for the simple reason that his quartz is far too expensive a material for us to contemplate in the practice of clay working. Quartz to him would mean a rock crystal, *i.e.*, silica in its purest rock-like form. We prefer to use the term "quartz" according to a wider meaning, and to imply by it any form of crystallised silica. We should even like to include in our term that substance known to geologists as quartzite, which is really a conglomeration of quartz grains or quartz in a granular condition. We should thus include all sandstones which have either been hardened by heat or by water during the world's history so that they assume the aspect of quartz rock.

From the clayworker's point of view we may call sand comminuted or finely divided quartz, and wherever we can make use of sand that is suitable as regards grain and sufficiently free from foreign matters, we shall naturally score heavily, for nature will have already done for us the grinding process which is necessary before we can use the material with our clay. Unfortunately there are many districts in this country, which, whilst possessing plenty of quartz do not possess any sand, and it often becomes more economical to quarry, crush, and grade quartz rock, instead of importing sand from a distance.

The object of using crystallised silica with our clays is well known. It tends to correct the aluminous character of the clay which would cause it to behave badly when subjected to strong heat. It corrects shrinkage and it also corrects expansion. It acts on high temperatures from a chemical point of view, entering into combination with the other ingredients of the clay to form true silicates; but it also acts from a mechanical point of view, tending to keep the clay open and more porous.

The kind of quartz which may be employed in clay working is immaterial; and the fineness of its division is the main factor influencing its behaviour when mixed with the body of the clay. Of course, if we were making fine porcelain the kind of quartz employed would be very influential; for example, we could not make a good white body if the quartz were deeply tinged with iron.

If we are intending to make any given body from a given clay then we must always have the same quartz graded to the same degree of fineness. This is obtained by grinding and sieving. Now quartz is an extremely difficult thing to grind, and even quartzite, which is more or less granular, is also very difficult to break down. The process, however, is very much facilitated by heating the lumps of quartz in a furnace or on the top of open kilns, etc. In fact, the quartz may be heated anywhere where it may be given a high temperature, and where it is possible to remove it when that temperature has been reached. As soon as the quartz has got very hot it is simply quenched by removing it and throwing water over it in the same way as coke is quenched when it is withdrawn from the coke oven. Care must be taken not to heat the quartz too high, otherwise a glaze will appear to form upon the surface, which is in reality in the nature of a skin formed by the melting of the silica. If this skin forms the quartz will not disintegrate readily after it has been quenched.

We will suppose that our readers may not have the facilities for heating and quenching quartz. In that case they will have to build a special furnace. The most suitable, perhaps, is at the same time the cheapest to construct and the simplest to manage. We recommend an upright double conical furnace which should be set upon a natural or artificial hillock about 15 feet high. This furnace may be charged with alternate layers of fuel and quartz, and when the lower layers have become sufficiently heated a few of the fire bars may be withdrawn and the quartz allowed to fall into water. As the water soon gets heated and much steam is formed, it is preferable to construct beneath the fire bars a channel through which running water may pass. As the lower layers are withdrawn from the kiln, fresh quartz may be charged in at the top.

Should it happen that the quartz is superficially stained with iron this heating process can be utilised for getting rid of it, for if, when the quartz is heated, some salt be thrown in on the furnace bars, this will combine with the iron and form ferric chloride, which will become volatilised, and will pass off into the air leaving the quartz clean and pure.

After the quartz has been quenched, it can be immediately ground in a revolving pan, or by any other grinding machine and graded by passing it through sieves.

BRICK PAVING.

HOW TO SECURE SATISFACTORY RESULTS.

According to the report of the city engineer of Wheeling in the United States, brick paving has been in use in that city since 1883. To secure satisfactory results he finds it necessary that the brick should be purchased by the Board of Public Works, and inspected at the kiln by a competent man employed by the city. In this way unsuitable material is prevented from reaching the city. During the past year the inspector for Wheeling found it necessary to condemn many bricks. It has also been found advisable in awarding contracts to base the payments on the number of cubic yards of actual excavation, the amount of stone or gravel actually used in preparing foundations, and the number of square yards of sand cushion, bricklaying and sanding. If this method is followed, the contractor has no incentive to slight the excavation or filling. It has been found that contracts of this sort have resulted in greatly improved work, because a good foundation is the most important element of a satisfactory pavement. The present practice, after the excavation has been finished, is to consolidate the subgrade with a 17-ton steam roller; in this way all soft places are detected and can be filled with stone or gravel. When this has been done the foundation is sometimes strong enough to receive the sand cushion directly, but frequently it is necessary to cover it with 9 inches of stone and gravel thoroughly rolled before a suitable base can be obtained. Tar and pitch were formerly used for filling the joints, but it has lately been replaced by sand at a reduction in cost of about 10 cents and without any material injury to the durability of the pavement. On a bad foundation tar has been found of some value in keeping water from softening the earth, but with a well-drained foundation it is not considered essential. Moreover, the use of sand has also made it much easier to repair pavements, as tarred brick are cleaned with difficulty, and even after being cleaned are frequently of little value.

MUTUAL INSURANCE.

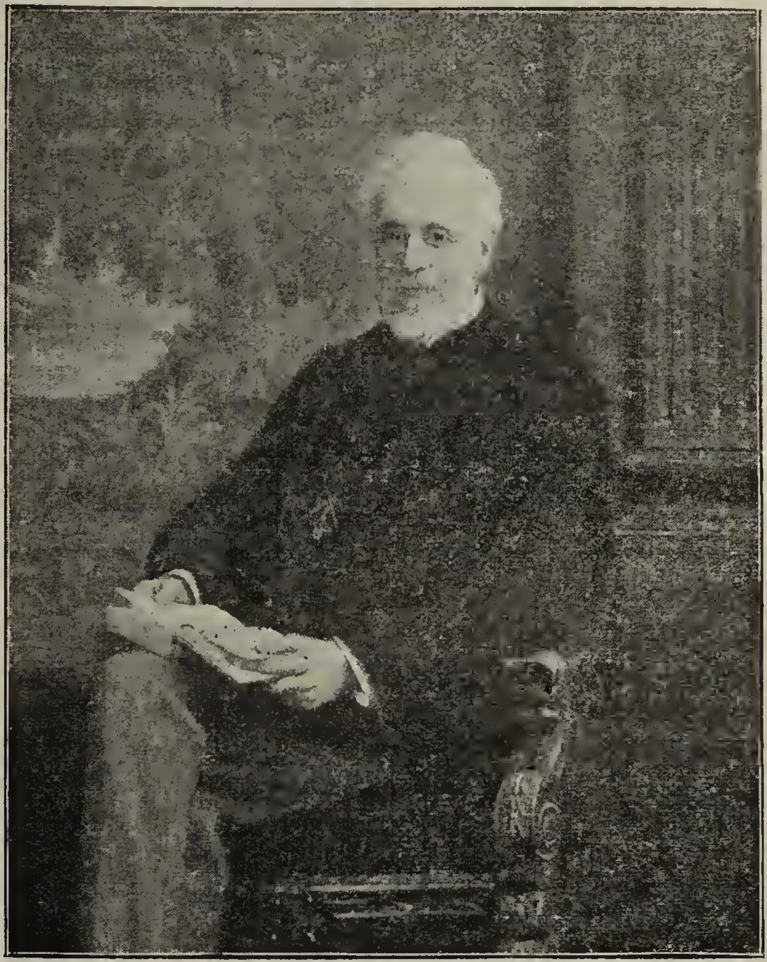
WE are glad to state that the appeal we made to clayworkers in our last issue to rally to the support of their own company, has met with an enthusiastic response, and that the affairs of the company continue in a very flourishing condition. This must be sorry reading for certain insurance companies, who, by cutting prices to ridiculous figures, had hoped to bring about our collapse, and thus get the field to themselves. For those brickmakers who, professing allegiance to us, have used us only as a catspaw to obtain a lower quotation for themselves elsewhere, we can have nothing but contempt. Such men have not even the decency to thank us for having procured them a rate that is enjoyed by no other trade carrying equal risks in this country. Of course all this senseless rate-cutting cannot long continue, and the point is whether it is better to deal with a company that will give a fixed and fair rate, or with one that will exact as much as it can, and then climb down when it is forced into a corner. After all, there is absolutely no company that can work a business of this kind so economically as one that is so much in touch with the trade, and if a man thinks he pays too much for his insurance now he is only placing his money out at interest for a time and gets it back again, either by a bonus on his insurance, or by dividends on his shares.

We can only again warn those clayworkers who are coquetting with wrecking-price insurance companies, that they are doing so to their own detriment, for those companies themselves admit that they are undertaking such business at a direct loss. Once we are out of the way the field will be clear for a return to old prices again. The brickmaker is a foolish man indeed if he deliberately contributes to his own eventual loss for lack of a little farsightedness.

IVORY STONEWARE.

IN Germany great excellence has been achieved in the manufacture of stoneware, and some of the manufacturers there are celebrated for their ivory goods, which have a peculiar and attractive colour. We have recently been informed that the colour may be imparted by the admixture of iron oxide, but as the mechanical incorporation of the pigment is difficult to effect with the requisite uniformity, it is better to resort to precipitation by mixing a solution of ferric chloride with a portion of the clay, and then stirring in caustic soda until the whole becomes just alkaline to test paper. The sodium chloride and excess of alkali are removed by water, and the coloured mass is carefully mixed with the bulk. The employment of rutile for the same purpose cannot be recommended, owing to the expense of this earth, and the fact that its colouring power depends solely on its content of iron oxide and not on the titanic acid. The most uniform coloration is imparted by an admixture of yellow-burning plastic clay, which, provided the glaze be modified in conformity with the altered co-efficient of expansion of the mass, gives the best results of any method.

THE LATE SIR HENRY DOULTON.



Memorial Portrait, painted by Ellis Roberts, and presented by Messrs Doulton & Co.'s workpeople, Burslem, to the Wedgwood Institute.

CRYSTALLINE GLAZES.

RECENTLY a great congress was held in Vienna at which a well-known expert, Herr Schmidt, described his researches on zinc silicate crystalline glazes, produced by applying a glaze of $SiO_2 + ZnO$ on porcelain, previously fired with a refractory glaze. On re-firing the second glaze assumed the crystalline form, the crystals being presumably "Willemite." It requires to be fired in a constantly oxidising atmosphere. Handsome colours can be produced, copper oxide giving Celadon; a little cobalt oxide, pale blue; chromium and tin together, yellowish red; nickel oxide forms a Persian blue glaze—instead of the usual brown shade—with blue crystals.

FIRING SEGGARS.

MR. C. COPELAND, of Burslem, has recently devised a new process for "flouring" articles, when fired in seggars, which ought to appeal to many of our readers on account of the saving of space. Any known mixtures used for "flouring" colours on decorated earthenware are formed into blocks, either by compression of the dry substance, or of the substance mixed with water or acid by suitable dies, or by pouring the paste formed from the dry substance and water or acid into suitable moulds. To prevent crumbling these blocks are enclosed in wrappers of paper, zinc, or other substance. The room occupied by vessels for holding the powdered substance is thus saved, and more ware can be placed in the seggar for firing.

THE PRACTICE OF GLAZING.

HOW TO SUCCEED AND HOW TO FAIL.

(*Continued from page* 354.)

Transparent colours may be rendered quite opaque by mixing them with oxide of tin, and then any glaze in which they are used will be impervious to light and may strictly be called an enamel. Oxide of zinc is a remarkable useful substance to the manufacturer of glazed goods, for it not only has the power of conferring opacity, but can actually enliven the different tints used : this is a property peculiar to tin oxide, and the effect of it is greatly enhanced by the fact that it imparts no colour to the glass. As an instance of this we may mention that the addition of oxide of zinc greatly enlivens the sulphur-yellow colours produced by oxide of antimony.

As the property of communicating any desired colour to glass is confined within certain limits of temperature, beyond which the tint varies, or is altogether destroyed, a certain classification of colours becomes necessary, according to the reaction of the temperature upon their constituents. They are, therefore, divided into such as have the power of withstanding the most intense heat of the firing kiln, and which can be burnt in with the glaze—termed refractory colours,—and those which afford no colour at such temperatures, on account of the volatilization, or only a very imperfect tint, and which are designated muffle colours. The latter require to be applied to the wares after the process of glazing has been completed, and afterwards fixed in a furnace called the muffle, and at a temperature far below the fusing point of the glaze or body of the ware, othewise they would run and penetrate into the glaze. Muffle colours, being painted upon the ware in relief, can be distinguished by touch from the decoration in refractory colours, and impair by their projections the lustre and smoothness of the surface, besides being more liable to suffer and wear away by friction. It is worthy of remark, also, that the firing of refractory colours causes no increase in expense, while the burning in the muffle is a constant source of additional expenditure.

The most important of the refractory colours are as follows :—

1. Blue, with cobalt.
2. Green, with chromium.
3. Brown, with oxide of iron, oxide of maganese, and perchromate of iron.
4. Yellow, with oxide of titanium.
5. Black, with oxide of uranium.

All these pigments have a very intense tinting power and therefore can be used in very small quantities. There is another advantage in using them, inasmuch as they exercise no solvent action on the glaze, nor upon the mass of the goods. They may either be applied directly or else upon the glaze, but in every case a flux must be used. Muffle colours can be incorporated with a great variety of fluxes ; the most important of them, however, are clean sharp sand, quartz, saltpetre, borax, boracic acid, felspar, potash, soda, and the lead compounds.

Salt Glazing.—This practice of salt glazing does not present many opportunities for mistakes, and indeed much of the best salt glazed ware in this country has been produced by men entirely ignorant of anything but mere rule-of-thumb methods. Salt glaze is applicable to all kind of clay, and also, as is well known, to stoneware. Indeed, in the latter direction stoneware glazing has made marvellous strides of late years since the authorities have woke up to the fact that our wares are the most suitable that can be used for all sanitary purposes.

The process of glazing with salt should always take place towards the end of the firing when the material may be thrown into the kiln through special apertures. The temperature of the kiln being considerably above a red heat, volatilizes the chloride into a vapour which, filling the chamber, surrounds the wares, and causes a reaction to take place with the silica of the mass. These two substances, silica and common salt, only act upon each other in the presence of aqueous vapour, and which is always present in the flame of the furnace. With the sodium of the chloride, the oxygen of the water produces soda, which enters into combination with the silica, while the hydrogen unites with the chlorine, and is evolved as hydrochloric acid—$NaCl + HO = NaO + HCl$. The glaze is, therefore, a soda glass, and exists as a very thin coating upon the surface of the wares. Clays which contain less than fifty per cent. silica are without action, and do not decompose salt. A brown colour is communicated to the wares by throwing into the furnace, during the glazing process, substances which afford a large volume of smoke, such as the bark of the birch tree.

One of the greatest difficulties which is met with in glazing with salt is that sometimes the surfaces, especially the interior surfaces of sanitary tubes, will not take the glaze, and in the language of the burners the surfaces remain "dry." This is invariably due to an insufficient amount of aqueous vapour being present in the kiln, and consequently means must be taken to supply the deficiency. There is no doubt that this is generally the cause of "dryness," for it has been noticed that on wet days there is actually not so much tendency to dry surfaces as there is when the atmosphere is very dry, as for example in May, when the winds are easternly.

Earthenware.—Our remarks will scarcely be complete without stepping aside for a short space to deal with the glazing of common earthenware. In the composition of the glaze the following substances are used in greater or less proportions :—Felspar or Cornish-stone, flint, sand, borax, soda, tincal, boracic acid, crystal glass, minium, litharge, white lead, borate of lime, china clay, carbonate of lime, smalt ; the proportions of which differ considerably, partly on account of the variable nature of the body, and partly according to the requirements of the ware, whether white, printed, or painted. The glaze is, however, always white, and contains lead, alumina, and soda. Minium and the preparations of lead exert a softening action, while the oxide of cobalt, used in very small proportions, rarely exceeding one thousandth part, is for the purpose of imparting a delicate blue tinge to the glaze, and counteracting the yellow colour of the body of the ware. The essentials of a good glaze are transparency, absence of colour, sufficient hardness to resist abrasion, and the property of expanding by heat in nearly the same ratio as that of the body of the ware. The various ingredients are mostly fused together or fritted, and afterwards ground, sieved, and purified, as described, to free the slip from iron to form the glaze. When melted with borax or boracic acid and soda, it is a perfectly transparent green colour, with tincal it is impure in colour and of a dirty brown. The preparations of lead do not always enter into the composition of the frit, but are added to the glaze in the grinding process, with the stain also finely ground. These materials being formed into a thin water fluid, the process of glazing is the same as that described in the earlier portion of this article.

A BRICK-BARGE RACE.

NOT barges made of brick, be it said, but just the barge of commerce used for the conveyance of bricks by the well-known firm of Eastwood & Co., Ltd. It was a happy idea on the part of this firm to create a wholesome rivalry among their men by having an annual barge race from Gravesend to the Medway. A party numbering over 200 were invited to view the contest on July 4th, and a steamer was specially chartered for their convenience. The Thames barge plays a prominent part in the economy of Messrs. Eastwood's extensive operations, no less than forty-four being owned by them. Only twelve, however, entered the contest, the "Durham" being adjudged the winner, and a very smart craft she is. These barges carry from 30,000 to 50,000 bricks each, the Durham having a capacity of 48,000. The boats trade as far East as Aldeburgh in Suffolk, and from Dover to the Thames. The cost of the barges is from £800 to £1,000 each. The arrangements for the contest were conducted without a hitch. Mr. G. E. Wragge acted as commodore, and Mr. H. J. Byrne as general *factotum*, a part he played to perfection.

THE START.

THE DURHAM.

THE NORTHUMBERLAND.

TRADE NOTES.

CO-OPERATIVE BRICKMAKING AT EXETER.—To cope with the demand for bricks in Devonshire, it is stated, the Exeter builders have combined to form a brickmaking company on a co-operative basis. Their brickyard is to be on the Whipton Road, close to the London and South Western railway line, and the company hopes to start work in a few months.

SALE OF A CHESTER YARD.—On Saturday Mr. J. J. Cunnah, of the firm of Messrs. Cunnah & Roberts, sold at the "Blossoms" Hotel, Chester, by order of the High Court of Justice, the Afonwen Cement Works, Caerwys, together with yards, clay beds, limestone quarry, marl beds, cottage and agricultural land, containing in the whole 19a. 3r. 33p., and the vendor's interest in some leasehold land adjoining. The property was acquired by Mr. Capel Cure for £3,000.

BORINGS FOR BRICK-YARDS.—We are glad to draw the attention of our readers to the fact that Mr. Harry Featherby, son of Mr. J. R. Featherby, J.P., of Gillingham, has started in business for himself as an artesian well engineer and pump maker at Bishop's Stortford. Mr. Featherby takes up his work having the great advantage of a practical working knowledge of his business, having studied engineering at Manchester, and taken a course of geology under Professor Boyd Dawkins. There is need of a man of Mr. Featherby's calibre in the brick trade, and we trust that our readers will give Mr. Featherby a trial should occasion arise.

A NEW FUEL.—The new fuel which has been invented by a Mannheim workman named Montag has, it is said, three times the heating power of the best Silesian or Scotch coal, while its cost is only half. The exact composition of the new fuel is, of course, a secret, but peat moss and a special clay play an important part. It contains also some mineral substances. A renewed examination of the soil at Hockenheim, near Mannheim, shows that most of these substances are contained in it. The ground belongs to the town, and is about 200 acres in extent, part of it lying on the railway line. The company is making strenuous efforts to acquire this tract either by purchase or by lease.

(Continued on page 114.)

THE QUALITIES & LIMITATIONS OF CERAMIC PRODUCTS.*

BY KARL LANGENBECK.

THE builders of all ages have resorted with utmost freedom to the use of clay and the products that are made from it as structural material and as means of furnishing and beautifying the house.

This has been no less the case in the earliest times, when the adobe hovel superseded the cave dwelling, than in the latest structure of cement and terra-cotta.

It would seem trite, therefore, to discuss the subject of clay as a building material, if the manifold uses and properties of clay and its products did not bring up many problems that present themselves in different aspects to the architect and the ceramist.

As clay is the decomposition product of nine-tenths of the common rocks, as it is readily transported hither and thither by rain, landslides, winds, streams, and ocean currents, its universal distribution brings it to hand almost everywhere. It differs, of course, much according to the rocks it has been derived from and according to the way it has been mixed, but its fundamental properties, chemical and physical, are so marked that everyone will recognize it as *clay*, and every clay has a practical use to which it can be put. There is no such thing as a good clay and a poor clay, though, of course, a clay may be good or poor or worthless for a *particular* use.

The prime quality by which everyone recognises it, its plasticity, and the attendant quality of being able to sustain itself in masses of almost any size or shape, make for it universal utility, as its formation and transportation, which I have just pointed out, make for it universal occurrence.

These properties *alone* are the valuable ones for many builders: for instance, the railroad, hydraulic, and military engineer; not so with the modern architect. But while the architect may never be called upon again to build the adobe hut, remember that the Assyrian palace stood to our day, until its mud walls were robbed of their incrusting alabaster slabs and glazed tile.

Remember, too, that the military engineer has discarded stone walls for clay banks, and that stone forts, turreted castles, and battlements, once so formidable, are now laughed at as the bugaboos of a childish age. Are architects sure that they could not build many an incrusted mud wall to-day at less cost and greater utility than many they now build of costly material?

There is no human history of early building or fashioning with clay. We always had it, as the animals had it before us, and I believe the architect will realise some day, as the military engineer has already learned, that the grandmother arts of the wasp, the mud swallow, and the beaver can still be as modern as they are ancient.

The property of hardening in the fire is also a very early human discovery. It was an incidental observation made even before fire was kindled for a purpose, and at its very awakening human intelligence combined the idea of these two properties of clay, forming and hardening, so that we cannot put our fingers on a race in the lower stage of barbarism that has not left us vessels, figures, or utensils so made, except perhaps in the Arctics.

It may be of interest in a history of building that in exploring the mound fort near Madisonville, Professor Putnam discovered that the ancient builders had hardened the surface of the embankment by burning it topically.

While these are the fundamental properties on which all the clay materials in the building arts are made, and which man has always known, they derive their greatest value to the architect from a property learned only by long experience, but which, in spite of this, he is constantly prone to forget. This is the absolute indestructibility and permanence of clay products to disintegration and wear. The bricks in the baths of Titus and Caracalla are without signs of disintegration, while the stone of the Colosseum is strongly decayed. The marble in the tesselated floors of Roman villas still preserved in France, along the Rhine in Germany, and about Bath in England, were worn through in the days of their use, while the tessera of baked clay in reds, buffs, browns, etc., used in conjunction with the marble in the same floors are hardly touched to this day.

In the lobbies of many public buildings paved with marble tile and red or blue *clay* tile in the corners, the marble is so dished through wear that the clay tile in their corners stand ⅛ to ¼in. above their level, yet the public and even the architects hardly believe their own senses in witnessing this common fact, for a very natural reason. The velvety texture of even a hard-burned clay *looks* soft; the polished surface of a natural stone always *looks* hard and immutable to the elements of wear and atmospheric disintegration, yet on the mineralogist's scale the hardness of the former is nine as against four to five for the best marbles.

It may be well to remind you in this connection of the scientific reason for this indestructibility of clay and clay products; it is that clay is the residuum from the breaking down of nearly all rocks. It is what is left of rocky material when the mechanical forces of the earth and the chemical action of the atmosphere have done their worst and the tooth of time can do nothing further. But less obvious properties than plasticity, solidifying under fire, and durability open out a still greater field of utility.

First, the clays themselves, depending upon their origin, burn to a great range of colours, from snowy white, through yellows, buffs and browns, to reds of varying shades, and their affinity for oxides of chromogenic metals such as manganese, cobalt, copper, nickel, iron, enlarges the colour scale into the blues, greens, pinks, black, etc. And these colours are without exception absolutely permanent. Fading is never possible, though, of course, they may become obscured and indistinguishable, even permanently so, by griming, if the pores of the body still admit, or through careless use are allowed to take up dirt.

Again, the indifference of clay bodies to fire, and the fact that their coefficients of expansion can be brought to the same degree of expansibility and contractibility as glasses and enamels, enables melting these upon their surfaces in thin or thick layers, making the porcelain and pottery industry proper possible, and opening out a palette of brilliant colours far beyond that of the clay colours themselves, and far beyond the possibilities of decoration with pigments.

And furthermore, clay products are among the poorest conductors of heat, offer effective resistance to its fusion and cracking, and are also non-conductors of electricity. These facts now largely interest the architect, for there is scarcely a building in which he does not have to consider them.

And lastly, let me add to this brief survey of the properties of clays, the discovery that a chemical union of *clay* with mortar materials, lime and sand, effected by heat and in proper proportions, has opened out in Portland Cement possibilities in masonry and moulding in the most durable of stones that would be inconceivable without such a material.

But all these conspicuously valuable properties of clay that have been utilised in the most manifold ways and have furnished the householder, the decorator, the engineer, the metallurgist, the electrician, and above all the architect, with a wealth of available utensils and materials, are all hedged in and modified by the most aggravating limitations and often the most unexpected drawbacks.

These difficulties are always present, and even attend the making of the simplest and best known articles, so that the manufacture of clay wares, from the ordinary brick to the finest of porcelain, or the production of cements, involves a technical skill and attention to subtle details almost unknown in other mechanical and chemical operations.

Particularly is this the case in the making of most building materials, so that many desirable properties are bound up with limitations, from which they are almost inseparable.

This may be illustrated by the following examples.

The more delicate a clay in taking fine impressions, the more plastic

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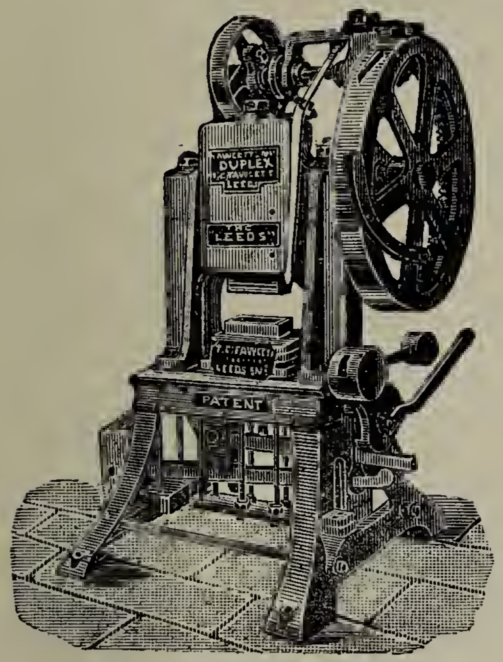
* Being a paper read at Cincinnati, U.S.A.



THE "LEEDS" BRICK PRESS

With Fawcett's Patent Stopping and Dead-weight Thicknessing Motion and Differential Pressure.

THIS Press is very largely used for pressing glazed bricks, which require to be all of exact equal thickness. It will press about 4,000 bricks per day with one boy to operate it, and will press them all of one exact equal thickness, although the quantity of clay may vary half-a-pound; this is done by the patent compensation arrangement of bottom moveable panel with levers and weights.

It is also suitable for pressing all kinds of plain and ornamental, red and glazed bricks, tiles, and terra-cotta work.

It is also fitted with my patent differential purchase gearing, for giving double purchase while pressing the brick, which is a very necessary and advantageous feature over other Presses.

The Machine is substantially built, and of the best materials; all bearings are bushed with best gun metal, and of extra large sizes. The pressure is obtained by our well-known patent toggle-motion levers, which are all of the best crucible steel; all the working parts can be seen while the machine is at work, and are easy of access for oiling, etc. It is very easily and quickly adjusted for different thicknesses of bricks. It is also fitted with automatic gear for stopping the pressing head at the top, after pressing the brick, and automatically lifting it out of the mould ready for taking away by hand instead of by the usual pushing arm; another brick is then put on, and by moving a small handle close to the operator, the machine starts and completes another cycle of operations.

THOS. C. FAWCETT, LTD.,
Whitehouse Engineering Works, Hunslet Road, LEEDS.
Makers of Patent Semi-Dry and Plastic Machines, Steam and Hand Presses, Pug Mills, Solid and Perforated Bottom, Clay Grinding Pans, Clay Crushing Rollers, Clay Mixers, Sieves, Engines, Shafting, and
GENERAL BRICK & CEMENT MAKING PLANT.
ILLUSTRATED CATALOGUES ON APPLICATION.

and fine grained it is, the more sensitive it is to the effects of pressure, which only appear after the ware is burned. This may show in the form of hair cracks, or again as bulged or protuberating welts, particularly if the piece is burned to vitreousness. If in turning up such a clay upon the potter's wheel, the workman's fingers press the clay too hard, though afterward it be turned off on the lathe and polished to the smoothest surface, the fire will bring out spiral rings upon the jar or vase, showing the original track of the man's fingers. If it be a bust pressed in a mould, the fire may bring out upon the smooth cheek of a female head coarse lumps or welts where the clay was forced too energetically. In a work of art more careful handling by a skilful and higher-priced man is the remedy, but in a commercial product or in a building terra-cotta it is necessary to use a coarser clay, which, while it does not show these blemishes, also takes a rougher impression. You cannot exact of a building ornament the surface and finish of a bisque figure without risking more objectionable features or paying a price far in excess of the value of the piece for the place.

Great advance has been made in the handling and caring for ware during the perilous operation of drying; ventilated drying rooms heated by steam coils that admit of close regulation of temperature, and mechanical lifts and carrying apparatus, which avoid strains to the tender freshly formed bodies. But the shrinkage, particularly of large pieces and of flat ones pressed from clay flour, which takes place in the drying, causes a certain percentage of loss, in spite of all precautions and corrective appliances, through cracking. Where this crack is not disfiguring, where it is beyond the possibility of observation, or does not impair the strength of the piece, why should it compel its rejection? It is cheap criticism that rejects because of an obvious but essentially unimportant blemish. It is this cheap criticism of a mechanical age that strikes from the category of our present building materials many a useful and beautiful article because the flawless ones are insufficient to pay for the loss of those foolishly rejected. If the Moorish builders had judged similarly, never would a mosque or minaret have been covered with tile.

We pay to-day an unnecessarily high price for building terra-cotta, because the manufacturer breaks and makes over many a piece that he would use in his own house, but is afraid to submit to the judgment of the architect and the building public.

Great improvements have likewise been made in the building of kilns and the management of the fire. The purpose of these improvements has been mainly directed toward eliminating the variations that the fire produces in the tint of the pieces according to their proximity to the source of heat and also to the variations in shrinkage that the same cause effects. Kilns are now built much larger than the old potters dared use, and improvements in pyrometric measurements are such that differences between the hardest and softest parts of a kiln can be detected within 25 degs., and can be regulated. Through these means larger amounts of ware of the same shade and size can be obtained than ever before.

But the variations in these can never be prevented altogether, and it is only possible to obliterate the effects of these variations by very careful sorting of the pieces according to size and shade. In the regular pottery industry this is not exacting, because the shape of the ware and the fact that the pieces are used individually lead to no exact scrutiny. But in the building materials, where many pieces are laid in close proximity, comparison to a minute degree is unavoidable, and this is particularly the case in tile. These are shaded often to forty different shades and sized to a variation which can just be recognized by the sense of touch, about $\frac{1}{64}$ of an inch. The former is done because the public demand absolute uniformity of tint, the latter because close jointing is exacted. Two rows of 3 in. tile 16 ft. long, varying about $\frac{1}{64}$ in. in the individual pieces, would show a variation of 1 in., a very important difference in a small floor.

The tile for the old English cathedrals were burned in little beehive ovens but 5 ft. or 6 ft. in diameter and 3 ft. high. The tiler had to crawl in on his hands and knees to set the ware, and the great floors were laid with practically all of the product without sizing or shading. As we look at them to-day, they are still satisfying. The jointing, large enough to take up the inequalities in size, gives a texture to the floor, the variation in shade, a liveliness of colour, and no shrill-voiced American woman ever freezes the marrow in your bones by exclaiming, "Ain't it nice—just like oilcloth !

With all our technical improvement, with all the expense and trouble of sizing and shading, so that 1,000 feet of tile are split up into little piles that will scarcely lay a 25 ft. vestibule each, we refine our product until it looks like the imitation, oilcloth !

I am frequently asked why it is not possible to make glazed tile that will not craze. It is possible. But if you expect to produce effects such as you obtain with the present glazes, if you demand the soft lead glazes that are highly refracting, and insist upon having the brilliancy heightened by having the glaze put on the pieces in a thick layer, the freedom from crazing can only be obtained in a small percentage of ware, the bulk of which shivers in the fire, being shattered, in other words, by the strength of the contracting glaze.

Brilliant effects of colour can be obtained by the use of thin, non-crazing coloured glazes, by using a number of colours in such artistic juxtaposition as to heighten the effect of each other ; but where you demand a single colour, as is now almost invariably the case, and expect it to be brilliant and satisfying, it can only be obtained by the conditions named, which carry the defect criticised fundamentally with them. But is this really a defect in a purely decorative ware?

Before the Paris Exposition, the manager of the Rookwood Pottery, when I was its superintendent, told me he would have to discontinue the work unless it could be made so as not to craze ; it was impossible for him to sell it because of this. I told him the condition could be fulfilled, but it would then not sell at all, because it would cease to be "Rookwood." The style and quality of the ware precluded its use for other than mainly ornamental articles ; why therefore ruin by technical conditions that are altogether utilitarian ? The factory struggled along until its products were submitted to the arbitrament of the French people at the exposition of 1889. It became famous at a bound. A timid American suggested to a French connoisseur, "But the glaze is cracked ?" "Any fool can see that," was the reply ; "what of it ?" No one of any sense or taste has alluded to the crazing of Rookwood ware since. But, it is claimed, a white wall tile is surely thin-glazed, and should be as free from crazing as table and kitchen ware shows itself to be under much more exacting use. But the bulk of our wall tile practically all craze.

Our domestic wall tiles are all made with highly refracting lead glazes, so that the individual piece will look as smooth and glossy as possible, and that because of the lower fire required in producing them they may be uniform in shade. They belong to the same category of wares as the coloured glazes, namely, faience.

If you could flatten out the curves of a cup or dish, you would be astonished to see that its glaze is not as smooth and brilliant as one of these tile, for a level surface reflecting the light entirely in one direction magnifies every inequality a hundred-fold. If you take a set of plates, looking absolutely the same in colour, and cut tile out of their bottoms, placing them together as tile are laid, you would marvel at the variation in tint. When builders waive their demand for brilliant, straight, and uniformly tinted wall tile, and have them hard fired and covered with alkali lime glaze, they will get tile that will not craze. Once accustomed to the matter, I believe, too, that they will be liked better. The blare of the glassy faience wall is not in good taste. The softer, more eggshell-like texture of the alkaline, porcelain-like glazes is far more agreeable.

Without instancing more of the innumerable problems and conditions that confront the clayworker, and upon which he must ask for changed views and compromises from the architect, I should like to answer the question that probably arises in your minds : "Is all the trouble of going into these conditions and details worth while ?" Of course the question will be dismissed as idle as soon as it is asked, for clay products always have and always will be used in larger and larger measure, and for finer and finer purposes. It is, however, well to bear constantly in mind that so many qualities of high merit, often no less subtle than the difficulties, appertain to clay wares, that no amount of effort in interesting oneself in these problems is without fruit.

Let me instance in this connection the superior frost-proof quality of brick, tile, and terra-cotta over all natural stones. It is a common fallacy to suppose that this property is merely attendant on density, and that these clay wares are only more frost-proof in proportion as they approach vitreousness. This is by no means the case. You are familiar with very porous sandstones that are far more frost-proof than hard crystalline rocks, having very little water absorption. Of course only a material having taken up some water will be shattered by frost. But a very small amount may be as destructive as a large quantity. The root of the matter lies almost solely in the homogeneity of the material.

When a body saturated with water is subjected to frost, the expansion of ice crystals does no damage to its structure if no obstruction is presented to the weaving of the crystals through the pores. If, however, the body is intersected with layers of denser or impervious matter, even if these be no thicker than a sheet of paper, an immense pressure is exerted on these planes, resulting in the cracking of the body or the splitting off of layers of the same along the planes of these denser divisions. There is scarcely a crystalline rock that is not intersected with these impervious or difficultly penetrable divisions, and under the action of the frost these are the lines along which sooner or later its structure breaks down.

Even rocks of such hardness and density as granite succumb to this disintegrating action, only topically and slowly it is true, but very distinctly for all that, as you can see on many a monument in almost any cemetery. Sufficient water for destructive action is taken up between the crystals of quartz and feldspar or hornblende ; this in freezing is impeded in its free movement by the thin and tough crystals of impervious mica, often lying in continuous layers over a larger patch, and the resultant pressure is sufficient to split off thin flakes and crystals from the surface, the chemical action of the water and atmosphere continuing the action in the rough and pitted places through their solvency.

Even poorly tempered and burned clay bodies are always free from impervious or denser strata, and under all circumstances more homogeneous than any crystalline rocks, which are often, and sometimes even minutely, crossed and recrossed with denser and almost impervious layers, only discoverable by the microscope. If the baked clay body be only sufficiently burned so that the cell walls of the pores are of reasonable strength, even a large water absorption does not endanger a breaking down by frost.

Another instance in which clay products stand unique in fulfilling conditions unattained in like measure by anything else is that of asepsis. The glazed surface of wall tile, and particularly the vitreous clay floor tile, can be scrubbed or wiped up with antiseptic solutions, like bichloride of mercury, and even the most efficient of these, permanganate of potash, followed by hydrochloric acid, without the slightest damage or surface pitting. This is of course out of the question with marble or any other wall or floor covering, and is so well understood by those experienced in hospital building that it is now seldom called into question.

Numberless other instances of conspicuous qualities of clay products for particular purposes could be adduced, but these will suffice to illustrate that their difficulties and limitations are amply compensated and are worthy of consideration and compromises.

WIRE-CUT BRICKS WITH FROGS.

A really novel brick, or at any rate one that could be patented, seems almost an impossibility, for nearly every conceivable shape has been given to bricks whilst preserving their general cubical form. A brick is such a simple matter that it seems almost impossible to imagine a real novelty. There is plenty of scope in connection with brick machinery, and many inventions are continually being made; but when we reflect that bricks have been made since the very earliest times, it is rather remarkable to see something which is really new being put forward. Yet Mr. Daniel Cornish, a brick manufacturer, of Oaklands, Shenfield, Brentwood, Essex, has succeeded in patenting something distinctly original in the way of bricks.

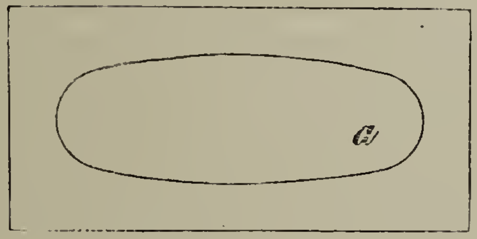


Fig. 1.

A wire-cut brick with a frog has not to our knowledge ever been produced, though builders have often asked for them. The wire-cut is a particularly economical brick to produce, but being devoid of a frog it is often not specified by architects, because they cannot be "tied" together so well in the masonry. Consequently, manufacturers of wire-cut bricks have been obliged to adopt another process in order to produce the frog, and have had to press their bricks in a separate machine. Mr. Cornish has hit upon a very simple method of producing a frog in a wire-cut brick. He has devised a special tool by the aid of which an ordinary unskilled brickyard hand can rapidly cut out a frog either as the bricks are coming from the machine or, if it is preferred, when they are dry enough to handle after they have been hacked and are ready for skintling. In the latter case in all probability a neater frog would be produced, but the labour cutting the partially dry clay would be greater and consequently slightly more expensive. Any manufacturer who decided to adopt this method would have to consider which plan would suit his purpose best.

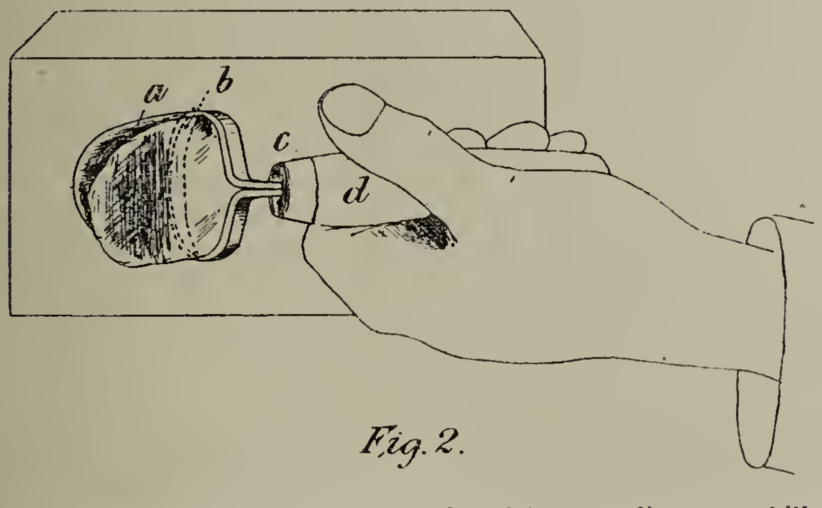


Fig. 2.

It is rather difficult to describe the tool that is used for forming the frogs, but reference to the drawing will make it clear that it is a curved knife of special shape. The blade of this knife is formed as a strong steel band bent into a ring or loop, the ends of the loop being brought together and secured into the handle. One edge of the blade is sharpened to a cutting edge. By reference to the drawings a plain view of a wire-cut brick formed with a depression or frog can be seen, and a prospective view of the actual operation of cutting out a portion of the brick to form the frog. From these figures I think our readers can gather a very good idea of the nature of this invention, which we must confess appears to us to be extremely neat and simple.

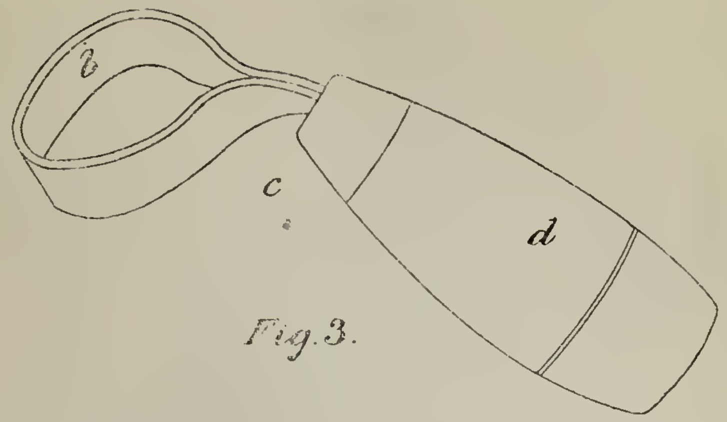


Fig. 3.

A NEW BRICKMAKING MACHINE.

In the new geographies which the coming generation will study it will doubtless be written that Peterborough is celebrated for its cathedral and its bricks. At any rate in the Fletton district bricks are being turned out at the rate of about seven millions per week. It is scarcely to be wondered at that in a district with such an industry inventive activities should be stimulated, and we have pleasure in noticing a new brickmaking machine which has recently been invented by Mr. Adam Adams, who is a brickworks manager at Old Fletton. In Fig. 1 is shown an elevation of the machine with part of it drawn in section; whilst in Fig. 2 there is a plan of the machine in semi-section. Essentially this new machine consists of a circular drum or cylinder which revolves continuously, and, as will be seen from the drawings, contains the moulds in which the clay is to be pressed. The machine is usually made as shown in the drawings with eight pairs of moulds, that is sixteen in all. Each pair can be removed easily and separately, which is obviously a great advantage.

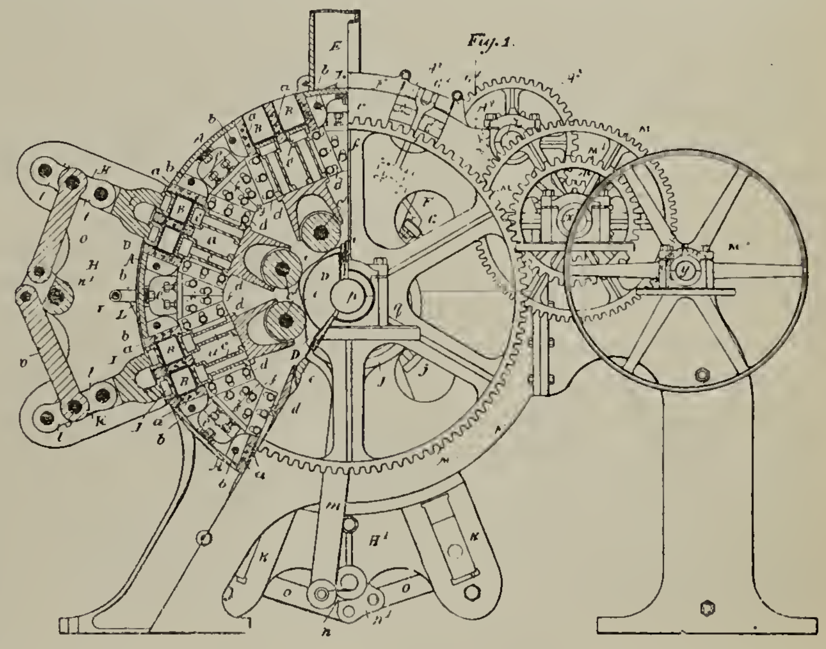
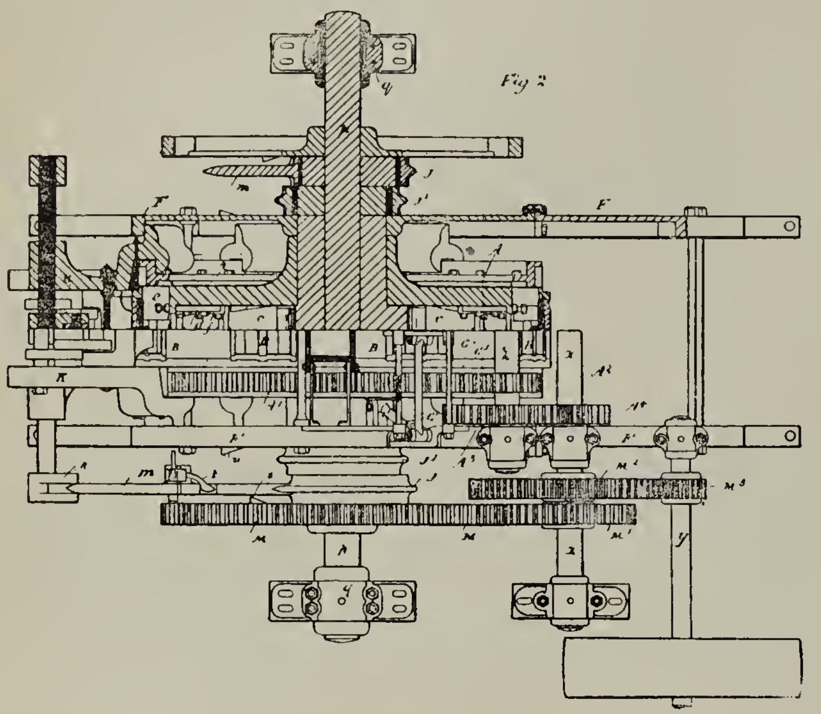


Fig. 1.

Each mould or set of moulds is provided with a bottom head or plunger, and these plungers receive their motion by means of a fixed cam round which they revolve with the cylinder. There are also top heads or plungers, each pair of which enters every other mould or pair of moulds once throughout a revolution, travel with



the cylinder while they give their pressures, and then are carried back by an automatic movement to their former position. This remarkable movement is something quite unique in brickmaking machinery, and appears to be given by means of eccentrics driven at the proper speed, and in the right direction as regards the cylinder, whilst the motion of the top heads or plungers, apart from their circular movement, is transmitted through toggle levers or some other mechanical arrangement. As soon as the bricks have received their proper pressure in shape by means of the action of the top heads or plungers they are pushed out of the moulds by means of the bottom heads, and are carried on to a table by means of such a contrivance as a rocking arm. Bearing in mind that this machine is designed for use in making bricks from the celebrated Peterborough "knotts," Mr. Adams has provided means whereby the top and bottom heads can be steam-heated.

The machine should be particularly interesting inasmuch as it does not appear to waste a single portion of its stroke, and so can turn out more than the usual number of bricks than might be expected, yet with a much slower movement of working parts. It seems to us, in fact, that this is about the most important part of the machine, viz., a large output and a slow movement. Another interesting feature is that only the full strain of two bricks at a time is ever on the machine. The cross-heads, to which are attached the heads for pressing the bricks, rock backwards and forwards together with the cylinder, each one taking alternate boxes, so that each brick gets two pressures. The clay may be fed into the boxes either by gravitation, using a travelling charger, or may be forced in by mechanical contrivance if the nature of the clay demands it. Altogether, we have in this machine something which seems to us that most brickmakers on the look-out for new machinery will want to see.

QUERIES AND REPLIES

Goods Cracking.—*I enclose a small piece of clay jrom one of my new fields (lying under a gravel bed) which has passed through the crushing rolls, also with it are two lumps that have* not *passed rollers. Can you tell me why it cracks so much in drying and what are probably the best remedies? It cracks in the drying of all we make—bricks, tiles, pots, &c. I want to know how to mix this clay to be a success for bricks, tiles and pots. I have plenty of sand, loam, chalk, ashes, &c., but have as yet been unable to find what will make it just right.*—C.

Have you tried any experiments wherein length of time has been taken into account, together with the method of drying? The clay is remarkably fine in grain and plastic for its composition. The analysis is not properly expressed; the rational formula is far too high for the real clay substance—kaolinite; it would have been far more convenient and instructive if the alkaline oxides had been calculated out to felspar, and the same shown; we should not then be confronted with 49·92 % as real clay in the face of 3·09 % combined water and 9.02 % alumina. It is probably owing to the really low percentage of the clay substance, the binding agent, that causes the trouble. The higher the percentage of kaolinite—the true clay substance—the greater the shrinkage, generally, and the greater the binding properties of the material; cracking will only result in such a case from drying too quickly. Loose, open, and poor clays may be more quickly dried, but they lack strength; such clays will often crack in drying because of sheer inability to exert the binding force required for the contraction. However, the trouble is usually associated with the methods and time employed in the drying.

Glazed Brick with Stain.—*We have forwarded a brick with a dark stain on it, and shall be glad of your opinion as to the cause. We think that it is the effect of steam. Our foreman says carbon.*—W.

The stain is due to the fact that at some period of the burning the brick has been subjected to a reducing atmosphere, extending over a considerable period of time. The kiln has been fouled with smoke, or the admission of air has been too closely restricted. Heavy firing at an early stage, choking up the fire-holes with coal, whereby air is excluded and combustion retarded, is generally at the bottom of this and similar troubles.

Stone Ware Kilns.—*Can you inform us ij* **D** *shaped muffle kilns are anywhere used for firing stoneware bottles and jars? If so, where? and what size is the most efficient and economical in firing? We are using circular up-draught, but consider them very extravagant in fuel.*—C.

Muffle kilns are not used for the work, but kilns the shape of a muffle ⌓, like the letter **D** on its flat side, are employed with excellent results. The kilns are long and large; the length being about three times that of the height, and are worked on the down-draught principle. Such kilns are in use, not generally, but one or more are to be found on the works of any of the leading stoneware potteries. You are working wastefully with so small a kiln, and on the up-draught principle withal! Large kilns always pay—all things being equal—better than small kilns, and down-draughts better than up-draughts.

Blue Bricks.—1. *Would an ordinary Newcastle Kiln satisfactorily burn blue bricks?*—2. *What heat is it necessary to subject bricks to, made of clay (making red bricks), mixed with iron swarf to produce blue bricks?*

We should not recommend an ordinary Newcastle kiln for burning blue bricks. Round Staffordshire oven give the best results, inasmuch as they can be controlled more accurately during burning. The oblong Staffordshire oven, however, gives excellent results, especially if the bricks are only to be brindled.

This question is rather difficult to answer for it is a fact that some clays blue at a lower temperature than others. We could not answer this question accurately without making a test. However, the proper temperature at which such bricks as you describe would blue would probably be represented by Nos. 5-10 on the series of Seger Cones, or a range of 1230° C. to 1330° C. These data must be accepted with reserve for we are completely ignorant of the nature of the clay.

ARTIFICIAL COLOURINGS.

A recipe for making dull pink bricks deep red states that a "little iron should be added to produce the desired result." That is right enough, but the clayworker is not told what kind of iron is to be added, nor how the process is to be effected. It goes without saying that any attempt to artificially colour with the semi-plastic process can only be partial and has to be done with extreme care. The time to add the colouring ingredient is in the pug, and it must be put in systematically (we were almost going to say automatically)—so much colouring to so much brick earth. Of course, we have all heard of "flashing the kiln," but that process is very slovenly and is not calculated to produce the best results. Now, as to the kind of iron to be employed. The best is what is known in the trade as brown ochre, but almost any earthy form of limonite will do, and that varies in colour from light yellow ochre, through light and dark brown to vermilion and crimson. This earthy iron is merely decomposed limonite, hematite, or other of the common iron oxides. The degree of coloration can only be determined by direct experiment, and the best uniform results are only obtained when each kiln is fired to approximately the same degree. Too much burning may turn the red bricks blue-black, and too little will not enable the iron to come out in its best form. If too much iron is added, little brown globules, mostly burst, are often found on the exterior of the brick, and there is a general partial slaggy appearance. Such bricks are not beautiful to look at, but they are usually sound and strong, and good for engineering purposes. Moreover, they have a rough surface, which is not produced with facility on bricks burnt almost to a slag. Red coloration is not found so uniformly where the iron employed has been ground to powder. The natural, decomposed iron is much finer, and being more earthy is most readily disseminated in the pug. Ground iron powder will do, but there is a general tendency for the bricks to be spotty. When brown bricks are desired manganese is the best mineral matter to be added. There again, care should be taken to get what is known as "wad" manganese, which is an earthy form. This mineral is quite black, and is an impalpable powder. The proportion of chalk to be added to make white or light yellow malms, depends on the quantity of iron or other mineral colouring agent present in the brick-earth dealt with. The chalk should be added only after being carefully ground. The whole question of artificial colouring is summed up in saying that it is practical experience based on scientific principles.

A NEW METHOD OF BURNING GOODS.

CLAY or other material used for the manufacture of bricks, terra-cotta goods, earthenware, &c., is mixed with ground or very fine riddlings of coal-slack or similar substance, in the proportion of about 1 cwt. of riddlings to sufficient clay to make 100 bricks. The riddlings being inflammable, heat is generated within the bricks, &c., thus ensuring complete burning, whilst, at the same time, economy in time, labour, and fuel is said to be effected. This has recently been proposed by Mr. P. Tickle, of St. Helens, but it seems to us to bear a very close resemblance to the old plan of making stock bricks in the London district.

THE LATE MR. JAMES DUCKETT, J.P.

WE regret to have to record the death of Mr. James Duckett, of Burnley, which occurred on June 23rd, at Ilkley. Mr. Duckett, who was 73 years of age, was a type of the sturdy, painstaking craftsman, who, from humble beginnings, had risen to fame and affluence. The firm of James Duckett & Sons, Limited, of Burnley, is a sufficient indication of the enterprise of its founder.

A NEW KILN FOR BRICKS AND POTTERY.

THIS kiln comprises a number of different compartments with arched roofs and side flues. Originally the side flues were continued as separate flues as far as the outlet into the arched roof, but now the flues are made separate for a short distance only, the walls dividing them being removed for the remainder of the distance to the opening into the roof, so that for this distance, instead of separate flues, there is an open narrow space. This new kiln has been devised by Mr. W. F. Mason and Mr. W. H. Wilson, both of Manchester.

EARTHENWARE FOR CHEMICAL, METALLURGICAL AND OTHER PURPOSES.

MR. A. MATTHEWS, of Widnes, in conjunction with Mr. W. Matthews, of Runcorn, state that earthenware for these purposes can be very much improved if it is burnt in a muffle or close kiln, into which carbonaceous gases are conducted, the result being that carbon is deposited in and upon it during the baking. The ware is intended to be applied to the same uses as that produced by admixture with graphite.

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BOOK-KEEPING FOR BRICK MAKERS.—VI.

The trading summary now completed will be found a useful account of the progress of the business month by month and will contain information which will enable the manufacturer to see where, if any, apparently unnecessary expense is being incurred and decide on the best means of economising.

At the end of, say, every six or twelve months stock should be taken, the books balanced, and a Profit and Loss Account and Balance Sheet prepared for the purpose of ascertaining the exact results for the period.

In order to make up these accounts, a trial balance of the books should be taken out in the usual manner, care being taken before closing the books to include all liabilities up to date of stocktaking.

From the material supplied by the trial balance, the Profit and Loss Account is made up and may be treated in the same manner as the trading summary before mentioned, so far as working out costs and average selling price are concerned, but the figures obtained from the Profit and Loss Account will be more accurate than those obtained from the Monthly Trading summary, on account of the inclusion of stock in the former.

The balance sheet is also prepared from the trial balance, and will be found to set forth the position in which the brickmaker has been placed as a result of the trading during the period, by showing on the one side the assets, and on the other side the liabilities of the firm, the excess of the former over the latter being represented by the capital. The consideration of a balance sheet is scarcely within the scope of a general article such as this, but attention should be drawn to the fact that the assets of a brickmaker are more or less of a wasting nature and that therefore the policy of the manufacturer should be to provide against their ultimate loss, by the provision of a fund which will amount to the value of the land and works when the clay has been worked out.

There are many points which present themselves in actual practice which cannot here be touched upon, but it is believed that a system of accounts such as the one here described if intelligently worked out will give figures which will be of the greatest value to those controlling their business.

APPENDIX.

BRICKMAKERS' ACCOUNTS.—FORMS.

No. 1.—THE EASTVILLE BRICK COMPANY SALES DAY BOOK.

1896.	James Bros.					
Oct. 1	To 6,000		2⅝in. pressed	35/-	10 10 0	
9	50,000		do.	35/-	87 10 0	
18	50,000		do.	35/-	87 10 0	
26	20,000		do.	35/-	35 0 0	
		126,000	d/d Hornsey		220 10 0	
1	6,000		3in. pressed	37/-	11 2 0	
25	3,000		do.	37/-	5 11 0	
		9,000	d/d Hornsey			237 3 0
	City Gas Co.					
1	50,000		2⅝in. pressed	26/-	65 0 0	
15	20,000		do.	26/-	26 0 0	
26	10,000		do.	26/-	13 0 0	
31	50.000		do.	26/-	65 0 0	
		130,000				169 0 0
	Thompson, J. L., & Co.					
1	24,000		2⅝in. pressed	40/-	48 0 0	
2	24,000		do.	40/-	48 0 0	
11	30,000		do.	40/-	60 0 0	
12	24,000		do.	40/-	48 0 0	
15	12,000		do.	40/-	24 0 0	
19	30,000		do.	40/-	60 0 0	
20	15,000		do.	40/-	30 0 0	
29	24,000		do.	40/-	48 0 0	
30	15,000		do.	40/-	30 0 0	
		198,000	d/d Bishopgate for Gresham St.			396 0 0
Carried forward ...		463,000		Carried forward ...		802 3 0
1896	Read, J. R., & Sons.					
Brought forward ...		463,000		Brought forward ...		802 3 0
Oct. 2	To 30,000		2⅝in. pressed	23/-	34 10 0	
5	15,000		do.	23/-	17 5 0	
		45,000	for Highgate			51 15 0
	Johnson Bros.					
2	42,000		2⅝in. pressed	36/-	75 12 0	
9	12,000		do.	36/-	21 12 0	
22	42,000		do.	36/-	75 12 0	
30	51,000		do.	36/-	91 16 0	
		147,000	d/d King's X			264 12 0
	Williams & Sons.					
9	30,000		2⅝in. pressed	37/-	55 10 0	
16	12,000		do.	37/-	22 4 0	
23	15,000		do.	37/-	27 15 0	
28	42,000		do.	37/-	77 14 0	
		99,000	d/d Highgate		183 3 0	
2	6,000		Seconds ...	32/-	9 12 0	
8	12,000		do.	32/-	19 4 0	
		18,000	d/d Highgate			211 19 0
	Day, John, & Co.					
3	20,000		2⅝in. pressed	25/-	25 0 0	
5	30,000		do.	25/-	37 10 0	
9	50,000		do.	25/-	62 10 0	
28	10,000		do.	25/-	12 10 0	
31	20,000		do.	25/-	25 0 0	
		130,000				162 10 0
		902,000				£1,492 19 0

Form 5.

No. 2.—MONTHLY ACCOUNTS BOOK.

JANUARY, 1896.

		Dr.			Cr.			
Number of Bricks.	Name.	Arrears from last month.	Current Month's Accounts.	Total.	Date of Payment.	Amount.	Discounts and Allowances.	Arrears forward.
		£ s. d.	£ s. d.	£ s. d.	1896.	£ s. d.	£ s. d.	£ s. d.
60,000	Arthur, R. W.	...	120 0 0	120 0 0	Jan. 26	118 0 0	2 0 0	...
130,000	Beckitt, J. R.	50 0 0	200 0 0	250 0 0	19	50 0 0	...	200 0 0
10,000	Freeman, T. C.	...	12 0 0	12 0 0	...	...	...	12 0 0
200,000	Thompson & Co.	100 0 0	300 0 0	400 0 0	30	396 0 0	4 0 0	...
50,000	Williams & Sons	...	80 0 0	80 0 0	14	50 0 0	...	30 0 0
1895. December.	Dixon, J. R.	35 0 0	...	35 0 0	17	35 0 0	...	...
	Holmes, F.	40 0 0	..	40 0 0	16	20 0 0	...	20 0 0
	Sampson, L.	20 0 0	...	20 0 0	18	20 0 0	...	...
November.	Anderson, J.	50 0 0	...	50 0 0	20	30 0 0	...	20 0 0
450,000		295 0 0	712 0 0	1007 0 0		719 0 0	6 0 0	282 0 0

No 3.—THE EASTVILLE BRICK COMPANY.—INVOICE BOOK.

					Revenue.								Capital.			
Date.	No. of Invoice.	Name.	Description.	Purchasers Ledger Folio.	Amount.	Coal.	Materials.	Repairs and Renewals.	Rates, Taxes and Insurance.	General Expenses.	Carriage & Carting.	Agent's Commission.	Land and Buildings.	Kilns. A.	Kilns. B.	Machinery and Plant.
1896.					£ s.	£	£ s.	£ s.	£	£	£	£	...	...	...	£
Oct. 31	1	Carrier, H.	Carting	3	30 0	...	...	...	...	...	30	...	...	...	...	...
	2	Wood Bros.	Timber	5	8 0	...	...	...	...	...	...	...	...	...	...	...
	3	Do.	Do.	5	7 0	...	...	...	...	...	...	...	...	...	...	15
	4	Bishop & Co.	Oil, &c.	7	3 15	..	3 15	...	...	...	...	...	...	...	...	...
	5	Binder Bros.	Duplicate Repairing Parts	9	18 10	...	...	18 10	...	...	. .	...	...	...	...	...
	6	Fowler & Co.	Oil, &c.	11	3 0	...	...	...	...	...	...	...	...	...	...	...
	7	Do.	Do.	11	3 0	...	6 0	...	...	...	...	...	...	...	...	...
	8	Imperial Insurance Co.	Fire Insurance	13	10 0	...	...	...	10	...	...	...	...	...	...	...
	9	Roller & Sons	Books and Stationery	15	20 0	...	...	...	...	20	...	...	...	...	...	...
	10	Smokeless Coal Co.	Coal	17	35 0	...	...	...	..		...	...	...	...	...	...
	11	Bridge Colliery Co.	Do.	19	24 0	...	...	...	...	...	...	..	...	...	...	...
	12	Marks, J. & C.	Do.	21	16 0	...	...	...	...	...	...	...	...	..	...	...
	13	North Junction Railway	Coal	23	...	...	...	...	...	...	...	...	...	...	...	...
	—	Do.	Carriage	23	50 0	125	...	...	...	...	...	...	...	...	...	...
	14	Do.	Brick Carriage	25	380 0	...	...	...	...	...	380	...	...	..	...	...
	15	Active & Co.	Agent's Commission	29	20 0	...	...	...	...	...	...	20	...	...	...	...
					628 5	125	9 15	18 10	10	20	410	20	—	—	—	15
					Imp. Led.	14	2	3	14	13	8	7		Priv. Led.		19

No. 4.—THE EASTVILLE BRICK CO.—SALES LEDGER.

JAMES BROS., 16, Conquest Street, Hornsey, N. 1

1896			£ s. d.	1896			£ s. d.
Sept.	To Goods	8	220 0 0	Oct. 10	By Cash	8	100 0 0
Oct.	do.	11	237 3 0	Nov. 1	do.	9	200 0 0
Nov.	do.	15	150 5 0	Dec. 1	do. and Dis. £5 3s.	10	157 3 0
Dec.	do.	18	120 8 0	Dec. 31	By Balance		270 13 0
			£727 16 0				£727 16 0
Dec. 31	To Balance		270 13 0				

CITY GAS CO., The Gas Works, Eastville. 2

1896			£ s. d.	1896			£ s. d.
Sept.	To Goods	8	88 14 0	Oct. 10	By Cash and Dis. 32s.	8	88 14 0
Oct.	do.	11	169 0 0	Nov. 10	do. do. £5	9	169 0 0
Nov.	do.	15	200 15 0	Dec. 1	do. do. 35s.	10	200 15 0
Dec.	do.	18	172 10 0	Dec. 31	By Balance		172 10 0
			£630 19 0				£630 19 0
Dec. 31	To Balance		172 10 0				

J. L. Thompson & Co., Bishopsgate Street, London. 3

1896				£	s.	d.	1896				£	s.	d.
Sept.		To Goods	8	200	0	0	Oct.	15	By Cash and Dis. £5		5 195	0 0	0 0
Oct.		do.	11	396	0	0	Nov.	10	do. do. £6		396	0	0
Dec.		do.	18	150	0	0	Dec.	31	By Balance		150	0	0
				£746	0	0					£746	0	0
Dec.	31	To Balance		150	0	0							

J. R. Read & Sons, Highgate, N. 4

1896				£	s.	d.	1896				£	s.	d.
Sept.		To Goods	8	38	0	0	Nov.	18	By Cash	9	38	0	0
Oct.		do.	11	51	15	0	Dec.	18	do. and Dis. £1 15s.	10	71	15	0
Nov.		do.	15	20	0	0	Dec.	31	By Balance		60	0	0
Dec.		do.	18	60	0	0							
				£169	15	0					£169	15	0

Johnson Bros., Colchester. 5

1896				£	s.	d.	1896				£	s.	d.
Oct.		To Goods	12	264	12	0	Nov.	10	By Cash	9	200	0	0
Nov.		do.	16	300	0	0	Dec.	1	do. and Dis. 12s.	10	64	12	0
Dec.		do.	19	75	0	0	Dec.	31	By Balance		375	0	0
				£639	12	0					£639	12	0
Dec.	31	To Balance		375	0	0							

Williams & Sons, Deptford, London. 6

1896				£	s.	d.	1896				£	s.	d.
Sept.		To Goods	8	300	12	0	Oct.	20	By Cash and Dis. £6 12s.	8	300	12	0
Oct.		do.	12	211	19	0	Nov.	24	do. do. 39s.	9	211	19	0
Nov.		do.	16	150	14	0	Dec.	18	do. do. £4 14s.	10	150	14	0
Dec.		do.	19	200	15	0	Dec.	31	By Balance		200	15	0
				£864	0	0					£864	0	0
Dec.	31	To Balance		200	15	0							

John Day & Co., Contractors, Fairholm. 7

1896				£	s.	d.	1896				£	s.	d.
Oct.		To Goods	12	162	10	0	Oct.	20	By Cash and Dis. 50s.	8	162	10	0
Dec.		do.		50	10	0	Dec.	31	By Balance		50	10	0
				£213	0	0					£213	0	0
Dec.	31	To Balance		50	10	0							

James Knox & Sons, Littlehampton. 8

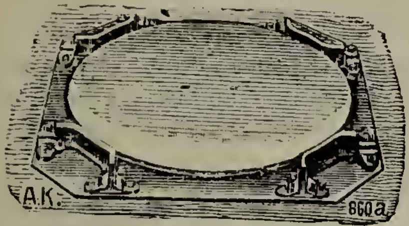
1896				£	s.	d.	1896				£	s.	d.
Sept.		To Goods	9	350	0	0	Oct.	15	By Cash	8	200	0	0
Nov.		do.	16	200	0	0	Dec.	26	do. and Dis. £7	10	350	0	0
Dec.		do.	19	150	0	0	Dec.	31	By Balance		150	0	0
				£700	0	0					£700	0	0
Dec.	31	To Balance		150	0	0							

J. Newman & Co., Yarmouth. 9

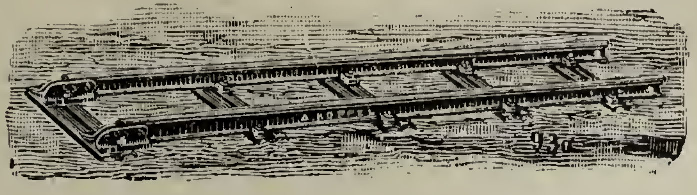
1896				£	s.	d.	1896			B.L.	£	s.	d.
Sept.		To Goods	9	150	0	0	Oct.	1	By two months' Bill	1	150	0	0
Nov.		do.	16	200	0	0	Dec.	2	one do. and Dis. £1	1	200	0	0
Dec.		do.	19	125	0	0	Dec.	31	By Balance		125	0	0
				£475	0	0					£475	0	0

R. Mason & Co., Torquay. 10

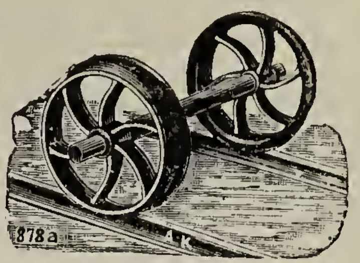
1896				£	s.	d.	1896				£	s.	d.
Dec.		To Goods		300	0	0	Dec.	31	By Balance		300	0	0
Dec.	31	To Balance		300	0	0							



TURNTABLES
quite flat
underneath,
requiring
NO TRENCH.



Telegrams—"ALIGHTING, LONDON."



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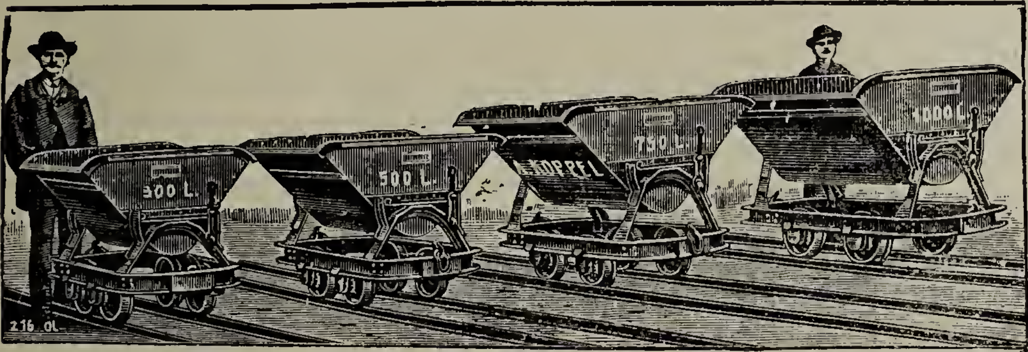
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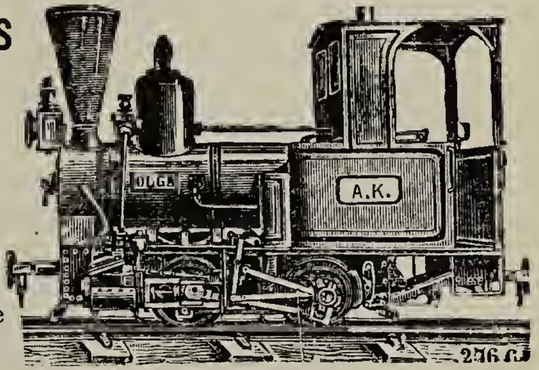

THE WORKMEN'S COMPENSATION ACT, 1897.

OBJECT LESSONS TO THE TRADE.

A PLASTERER'S CLAIM FOR COMPENSATION.

A case was heard by Judge Waddy, Q.C., at the Sheffield County Court on June 30, in which Messrs. Longden & Sons, Contractors, Sheffield, were sued by William David Dewer, plasterer, 113, Princess Street, Sheffield, under the Workmen's Compensation Act, for £4. Mr. L. J. Clegg was for the plaintiff, and Mr. Neal represented the defendants. Dewar was engaged on the plastering work at Walsh's new premises, in High Street, and on the 11th January had been working on the first floor. At eight o'clock, when it was dark, he was leaving his employment, and while descending an unfinished staircase fell into the basement. He had a rib broken, and was taken to the Royal Hospital, where his injury was attended to. For the defence, it was contended that the accident was the result of plaintiff's own action. A ladder was provided for the workmen to leave the building, and Dewar had no right to use the uncompleted staircase. A barricade was placed at the top of the stairs to prevent men leaving by that way, but plaintiff got either under or over this barricade, and went down the stairs, and in so doing he acted contrary to orders. Mr. Neal added that even if the plaintiff could recover, his wages only justified him in suing for £2 18s. His Honour visited the premises, and gave judgment for £2 18s. and costs. He, however, found that Dewar had been forbidden to use the staircase from which he fell.

HOW DAMAGES ARE ASSESSED.

Standen, Henry G., brickyard labourer, Eye, *v.* the Northam Brick Company. Claim £80 for damages to two fingers through an accident with a brick press in the yard of the defendant company. Mr. F. W. Atter for plaintiff and Mr. J. W. Buckle for defendant. After some discussion his Honour said what he proposed to do was to adjourn the case until September or October if the boy intended to go back. If he did not intend to go back he must dismiss the application. Under the statute he had no power to award the boy a farthing damages for the pain he suffered or any disfigurement. He was limited to the question of loss of wages, but if Mr. Atter told him the boy would not go back it altered the case. Mr. Atter said he could call the boy and his father, and they could speak for themselves. The boy, he understood, was willing to go back. His Honour: Then I direct that on the respondent renewing the offer of re-employment and consenting to paying the boy 4s. 6d. per week from 14 days after the accident to now, and the applicant being willing to accept such re-engagement, the case is adjourned for further hearing till the October sitting of the court.

A CURIOUS CASE.

THE case of Henley v. Young & Co. was heard on the 26th ult. in the Westminster County Court. Henley is a carpenter, and, having finished the job he was engaged on, was given notice. According to the rules of the trade he was entitled to one hour's notice for collecting his tools and one hour's pay for grinding them. It was during the hour allowed for collecting the tools that he fell down a hole and hurt his ribs. The respondents contended that the accident did not occur while he was working for them. He could have collected his tools at once, drawn his money, and left the job.

The Judge held that during that hour a workman was still in the service of the employers, but in this case the accident was not in the course of any act of service to the employers, and therefore there would be judgment for the respondents.

TRADE NOTES—*(Continued)*.

THE LIGHT RAILWAYS ACT, 1896.—The statutory applications under the Act are made in November and May each year. In November last the number was fifty-four, and in May last forty, the totals for the two previous periods of twelve months being sixty-five and fifty-six respectively. The estimated cost of the various projects applied for in the three periods amounts in the aggregate to £2,903,072, £4,652,904, and £6,722,963 respectively; those sums being for constructional works, and not including "promotion" and kindred expenses. Amongst the recent applications we may mention schemes for light railways in Bath and the vicinity; from Hollingbourne to Faversham (twelve miles) with a branch from Ospringe to Newnham; Hitchin to Leighton Buzzard; Wolverhampton to Bridgnorth; Bridgwater; Langport and Glastonbury; in and around Darlington; from Robertsbridge, through Brightling, Penhurst, and Ashburnham, to Pevensey (by the South-Eastern Railway); Lowestoft to Southwold; Fleetwood to Morecambe; Ryde Esplanade to the Pier at Sea View; in the Watford, Rickmansworth and Bushey districts; Kilburn High Road to Stanmore Hill, with branches to Willesden, Hendon, Edgware, and Barnet (Finchley District Electric Traction Company); and by the Middlesex County Council and the Metropolitan Tramways and Omnibus Company for Railways in Tottenham, Hornsey, Whetstone, Finchley, Hendon, and the neighbourhood.

GEORGE SMITH OF COALVILLE.—June 21 last was the fourth anniversary of the death of George Smith, of Coalville, whose work on behalf of gipsies and canal children will be remembered for a long time. He was the son of a brickmaker and started carrying bricks on his head at the age of nine. For thirteen hours a day he worked and it is wonderful that he should ever have obtained any education worthy of the name. In 1857 he discovered some valuable seams of clay at Coalville and was imprudent enough to talk about it. As a consequence, he lost the full advantage of his discovery, but succeeded in getting a manager's appointment. "The Cry of the Children," published by him in 1871, led to an act for the regulation of juvenile and female labour in brickyards. He thus became unpopular with the brickmaking trade and lost his managership in 1872. His work, "Our Canal Population," led to the Canal Boats Bill, which regulated the sanitary conditions of those living on such boats. Another Bill extending this reform was blocked by Sir Edwin Watkin and others, but passed in 1884. Turning his attention to the uneducated children of the gipsy encampments Smith worked hard to obtain a Movable Dwellings Bill, but the opposition was too strong. During most of his life Smith was a poor man. He had, however, a grant of the Bounty Fund about fourteen years ago and bought a house with it.

HOLBECK MOOR AS A CLAYFIELD.—The Town Clerk of Leeds has received a letter from the secretary of the Leeds Fireclay Company, Limited, stating that the company are prepared to dispose of their rights in the Holbeck Moor for the sum of £12,000. The City Engineer (Mr. Hewson) has received instructions to prepare a plan showing the situation and extent of the site, and to submit the same, together with any available information as to the nature and value of the minerals, to a sub-committee at an early date. A short time ago information leaked out that the Fireclay Company had purchased the manorial rights in the moor with a view to working the minerals. In the interests of the inhabitants of Holbeck the matter was brought before the notice of the Corporate Property Committee, pointing out to them that if the minerals were worked out the surface of the moor would here and there subside, and the open space thereby be rendered useless for recreation purposes. It was in consequence of these representations that the Town Clerk was instructed to communicate with the Fireclay Company on the matter.

BRICKWORKS BLAZE AT BRIGHTON.—CARELESS HANDLING OF PARAFFIN.—On June 25th, the patent ironstone brickworks of Mr. Guttridge at the top of Ditchling Road, Brighton, were the scene of a fire that, as it was, created no little devastation, and which, but for the prompt action of the Police Fire Brigade, might have had still more serious results. The fire commenced in the engine-shed at the brickworks, and soon the structure was a mass of flames. The cause of the fire was quickly elicited. The shed was a wooden structure, with a roof of corrugated iron; and it appears that three men employed on the works were getting some paraffin from a large cask which was stored in the shed, and that, while one of their number was holding a lighted candle close to the cask, the oil ignited, with the result that in a very few minutes the whole building was alight. One of the men, Alfred Johnson, of 9, South Street, Brighton, was shockingly burnt about the body. He was conveyed to the hospital, where he afterwards expired. Another of the men, Charles Reed, also of 9, South Street, Brighton, was very severely burnt. The third man, wonderful to relate, escaped without injury. The sight of the fire so affected Mr. Henry Guttridge, however, that it induced a fit, and the unfortunate gentleman had to be removed to his residence, where, in a semi-unconscious state, he was attended to by his friends. The scene of the fire itself is in a very inaccessible part, and, there being no houses in the near vicinity, the nearest hydrant was a considerable distance away. However, Superintendent Lacroix and 35 firemen, at once set about overcoming this difficulty. The Brigade's own hose was brought into requisition, and, together with that of the Volunteer Fire Brigade (who had sent a small hose-reel from Duke Street), a connection was made with the nearest hydrant, no fewer than 1,400 feet of hose being required. A steady stream of water was soon being poured upon the flaming building, but it was obvious that all attempts to save it would be in vain. A blaze of sparks and the clatter of the iron roof announced the falling of the shed, and the form of the engine stood out naked in the midst of the flames. At length, after unwearying exertions, the flames were conquered, and the crowd sent up a ringing cheer as the last flicker was quenched. All the casing was burnt off the engine. The hose was also turned upon another out-building, standing in close proximity to the engine and the fire effectually prevented from spreading.

MESSRS. SWINNEY BROS.—We understand that the business of brick-machine manufacturers carried on by the above firm at Morpeth, has been registered as a private Limited Liability Company.

BIG FIRE AT PAISLEY.—A serious fire occurred recently at the Ferguslie Fireclay Works, Paisley, occupied by Messrs. Robert Brown & Son. The building is used as a potters' shop in the upper storey with the stove in the lower. While the firemen were engaged extinguishing the flames a wall fell outwards almost burying a fireman, who, on being extricated, was removed to the infirmary. He died about midnight. It is estimated that the damage will not be less than £2,000.

MESSRS. SUTCLIFFE, STATHAM & CO., drying engineers, of Cathedral Corner, Fennel Street, Manchester, inform us that the style of the firm has been altered to the "Sutcliffe Ventilating & Drying Co." They will continue to manufacture the now well-known Sutcliffe Fan and also their special trolley system of drying bricks. We note that the firm are exceedingly busy in their drying department, having in hand large brick drying plants for the following firms amongst others:—The Cramlington Coal Co., Ltd., Northumberland; The Killamarsh Brick Co., Ltd., near Sheffield; Messrs. A. J. Saunders & Co., Ltd., Chesterfield; Legh Brick Co., Manchester; and Mr. J. Mosedale, Crofts Bank, Urmston.

Electric Power at Sittingbourne.—Messrs. Wills and Packham's Yard.—With their characteristic enterprise, Messrs. Wills and Packham, Limited, of Sittingbourne, the well-known brickmaking firm, have introduced electricity as a motor power in one of their brickfields, and an innovation of this character deserves more than a passing notice. The machinery driven by this new agency is in the field adjacent to Crown Quay Road, where three pug mills are at work. Formerly an eight-horse power portable steam engine was in use here. That was superseded by a large gas engine, and this, in turn, has had to give way to electricity. The new plant has been in operation for some little time now, and whether it be regarded on the ground of economy or of efficiency. it is answering fully up to expectations. In fact an advantage has been experienced by introducing the new motor power, for the machinery is driven at a higher rate of speed, and the dirt is being ground finer, with the result that the firm are able to turn out a better article. The generating station is situated in the building containing the splendid fifty-horse power (nominal) horizontal high pressure condensing Hargreaves steam engine. Here there is ample power to drive two or three dynamos if necessary. So, some of the power is being utilized to drive one dynamo—which may be regarded in the light of an experiment, for if it answers the idea is capable of considerable development. This dynamo represents about twenty-two horse power, when worked at full speed. By an automatic arrangement the pug mills in Quay Field, 300 yards away, can be thrown out of gear instantly, should occasion arise to do so. By overhead cables the electric current passes to the motor, being the connecting link between the dynamo and the shafting of the pug mills. Here the motor is being driven at a speed of 800 revolutions a minute, and everything is working with a smoothness and regularity that one would deem scarcely possible. The accession of power has proved to be very advantageous, as already indicated, and the motor requires but little attention. It does its work comparatively noiselessly, with a total absence of smell, while the economy of this new departure has been marked. So far, then, the introduction of electricity into the manufacture of bricks has been a success. But the very mention of the word opens up possibilities of further developments. Mr. Packham is very sanguine about the uses of electricity, and he has an idea that it might be utilized to light the offices, the workshops, and the docks on the Creek. In fact a scheme is in contemplation with this end in view, and it is practicable to carry it out with the present plant. Once the system of electric lighting has been put to the proof, there is no telling what the future may bring forth. It might be added that the electric installation at Messrs. Wills and Packham's works was put down by Messrs. Stevens and Barker, electrical engineers, Maidstone, and the work has been done in a manner that is a credit to that firm. With the extensive works of Messrs. Wills and Packham in full swing, representing an average make of thirty-five million bricks a year, it is difficult to realize that all this has been the creation of an ordinary lifetime. Mr. Daniel Wills and Mr. Henry Packham, the founders of the firm, are men of indomitable energy, and may be termed true examples of knights of labour. They are proud of the fact that they were working men themselves once. Natives of Rainham, they started from the lowest rung in the ladder. In 1860 they became associated with a view of founding a business, and, after working in modest fashion at Rainham for seven years, removed to Sittingbourne. Since then the firm has never looked back, and, under the guidance of the master minds at the helm, has gone on from success to success. Thus, thirty-two years after a small beginning in this district, we find that the firm of Messrs. Wills and Packham, Limited, as it is now known, own works covering 200 acres of ground in Sittingbourne and Milton, and give employment to something like 500 hands. Their workshops contain machinery of the most recent type; and steam, gas, and now electricity, have been employed in order to keep pace with the demands upon the resources of the firm. A fleet of well-found barges, whose names are household words for all that represents high-class efficiency and symmetry, carry the colours of the firm up and down the busy tideway of the Thames. Perhaps the time is not far distant when, under the *régime* of the Milton Creek Conservancy, we shall see electricity introduced as a new motor power upon an improved waterway. The only department that has not been affected by machinery is the actual moulding of the bricks; and as the hand-made Kentish article is claimed to be superior to the machine-made brick, the present state of things will continue. But the conditions under which the brickmakers work have vastly altered for the better during the past few years, and the mutual regard and self-respect that exists between employers and employed at these works perhaps explains to some extent the truly marvellous growth of the firm of Messrs. Wills and Packham, Limited. Long may it prosper.—*East Kent Gazette.*

Railway and Canal Traffic Act, 1888.—A return has been laid on the table of the House of Commons embodying the sixth report by the Board of Trade of proceedings under section 31 of the Railway and Canal Traffic Act of 1888, and of the action taken on complaints made under section 1 of the Railway and Canal Traffic Act of 1894. The Act of 1888 provides that when any customer of a railway company believes that when he has been subjected to an unreasonable rate of charge or has been treated in every other respect in an oppressive and unreasonable manner, a complaint may be lodged with the Board of Trade, which in turn may call on the railway company for an explanation, and endeavour to settle amicably the differences between the complainant and the company. Section 1 of the Act of 1894 provides that complaint may be made to the Board of Trade of the unreasonableness of any railway rate or charge which has been directly or indirectly increased since December 31, 1892, and if the Board of Trade are unable to effect an amicable settlement under section 31 of the Act of 1888 the complainant may then proceed to submit this protest to the Railway and Canal Commissioners for adjudication. The number of complaints submitted to the Board of Trade under the earlier Act of 1888, during the years 1897 and 1898, was 130. The proceedings taken by the Board of Trade in these cases resulted in forty-one complaints being amicably settled, the complainants in some cases expressing satisfaction with the results; thirty-three complaints were not proceeded with by the complainants; and in forty-eight cases an amicable settlement could not be effected. This leaves eight cases which are still being dealt with by the board, With regard to the Act of 1894, the total number of complaints of increased rates submitted to the Board of Trade since the passing of the Act has been 1,938. Of this number the President of the Board of Trade observes that it is satisfactory to note that only thirty-one are still under consideration. No less than 1,725 complaints were either settled or withdrawn, and of the remaining 182 cases in respect of which certificates were granted to enable the complaints to be submitted to the Railway and Canal Commissioners only a few cases have been so submitted.

English Kilns Abroad.—We are informed by Messrs. Sercombe & Co., kiln builders, of Leicester, that, besides the large number of kilns they are now erecting in England, they have contracted to build another in Australia and are sending men there to carry out the work. They have also sent plans and castings to Singapore, and have contracted to supply the company with fire bricks from this country.

Messrs. Johnson & Tucker, Hull. — This is a new firm of brick-machine manufacturers as far as name goes, although Mr. Johnson is well known to the trade, having been in the business all his life, and until recently, head of the brick-machine department of Messrs. Shepherd, Hill & Co., of Leeds. Whilst there, the work he turned out gave every satisfaction, and he goes to his new labours at Hull with every prospect of making a name for his firm in the production of first-class machinery.

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NO. 7A BRICKMAKING MACHINE by Whitehead, with rolls overhead, and hoisting gear, cutting-off tables, &c., complete.

Two No. 7 HORIZONTAL MACHINES by Whitehead, with crushing rolls, dies and cutting-off tables complete.

Large SCREW QUARRY PRESS by Pullan and Mann.

One nearly new powerful MACHINE by Sampson & Sons, two pairs of top rolls, one plain and the other corrugated, all complete for an output of 20/25,000 per day.

Two GILL'S PATENT PRESSES, one with engine.

"ECLIPSE ALL" BRICKMAKING MACHINE by Scholefield, with press and mixer complete.

Portable BRICKMAKING MACHINE by Bedford Iron Co., horizontal pug, mouthpiece, die, and cutting-off table, complete.

Set Ditto Ditto, rolls, 34 in. × 18¾ in.

Set Expression Rolls, gearing, housings, mouthpiece, &c., all complete.

Vertical Pug Mill, all iron, for steam power.

Several sets HOISTING GEAR.

CLAYTON, HOWLETT & Co.'s A3 HORIZONTAL MACHINE, thoroughly overhauled, rolls 30in. long, 20in. diameter, die and table complete.

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CLAYTON HOWLETT & Co.'s "one process" BRICKMAKING MACHINE, complete with die and table.

HAND AND ANIMAL POWER MACHINES—

No. 4 Hand Power Pipe and Tile Machine, Bedford Iron Co. type, complete with cutting-off table.

No. 3, Ditto ditto

No. 2, Ditto ditto

Several VERTICAL PUG MILLS for animal power.

BRICKMAKING MACHINE, consisting of vertical pugmill, die, and cutting-off table, for animal power.

IMPROVED HAND BRICK PRESS, with screw action from below.

CLAY PANS, &c.—

5 ft. 6 in. Under-driven Pan, rolls 2 ft. 6 in. diam., by Mason Bros.

7 ft. 0 in. Over-driven Pan, all complete, new. Weight 7 tons 10 cwt.

9 ft. Perforated Pan, complete, and in excellent order; over-driven.

9 ft. Under-driven Mortar or Clay Pan, rolls 42 in. × 17 in.

GENERAL ACCESSORIES FOR BRICKYARDS—

Second-hand relayable RAILS, 12 lb., 14 lb., 18 lb. New F.B. RAILS.

100 yds. PORTABLE RAILWAY, 2 ft. g., consisting of steel flanged rails, 14 lbs. per yard, and steel sleepers with clips, pressed out to receive rails, and made expressly for this section of rail.

Wrought iron and steel BRICK TRUCKS to carry 120 bricks each.

New WHEELING PLATES, 6 in. × ¼ in., in stock.

New BARROWS and CLAY WAGONS. List on application.

Specially prepared BRICK OIL that will not destroy the colour of bricks.

Best Sheffield Piano steel wire.

Best quality FUSTIAN for lining dies.

Hand, Horse Power, and Steam PUMPS.

ENGINES, BOILERS, &c.

HORIZONTAL, VERTICAL, PORTABLE, and SEMI-PORTABLE ENGINE and BOILERS always on hand. Customers are requested to kindly STATE THEIR REQUIREMENTS in this direction, and they will receive offers of the most suitable Machinery I have to meet their wants.

Specially repaired and in stock—READY for immediate delivery—one each 8 H.P., 9 H.P., 10 H.P., and 12 H.P. PORTABLE ENGINES all THOROUGHLY OVERHAULED.

Complete Brickyard Plants Estimated for.

Discarded or Surplus Plants Purchased in any part of the United Kingdom.

Inquiries for Machinery of every description receive prompt attention.

The "MANCHESTER" Continuous Kiln.

(Dean & Hetherington's Patent.)

This Kiln is superior to all others for Burning High-class Facings and Moulded Bricks, Terra-Cotta, Chimney Pots, Tiles, Quarries and other articles.

PRACTICAL MEN state it to be the only Continuous Kiln which has been known to turn out really High-class Goods, superior to any Down-draught Kiln (see Testimonial below).

THE UNRIVALLED ADVANTAGES OF THIS KILN.

It is far ahead of all others for the thorough drying of the goods whereby the finest colour is ensured. Green Bricks can be set as soon as they are hard enough for piling, and will come out of the kiln (after being treated with our hot-air drying system) of a beautiful tint, without any stain, and ***absolutely free from Loss or Waste.***

Our arrangement for the outlet of all steam and vapour from each chamber is altogether the most scientific in principle and effective in working that has been adopted in any kiln that has ever been erected on the continuous system. In **all other** continuous kilns the steam has to travel the whole length of the chamber **through all the goods** before it can get away : this very serious defect is entirely overcome in the " Manchester Kiln."

This kiln effects an economy in fuel of from 50 to 80 per cent. on any ordinary up and down-draught kiln. Our system insures perfect combustion, as may be seen from entire absence of smoke from chimney.

TESTIMONIAL.

The Redhill Bank Brickworks, Rocester, Staffs.,
May 27*th*, 1899.

Dear Sirs,—We have great pleasure in bearing testimony to the satisfactory working of the "Manchester Kiln" for the time we have had it in use, which is about nine months. The saving in fuel, as against the ordinary down-draught kiln, is a wonderful item. The goods come out a deal better in colour, and I may say are giving great satisfaction to our customers everywhere they go.

Yours truly,
A. HEWINS.

Messrs. Dean, Hetherington & Co.

Kilns are now being erected for—

Messrs. HARRISON & Co.,
Anslow, Near Burton-on-Trent.

and

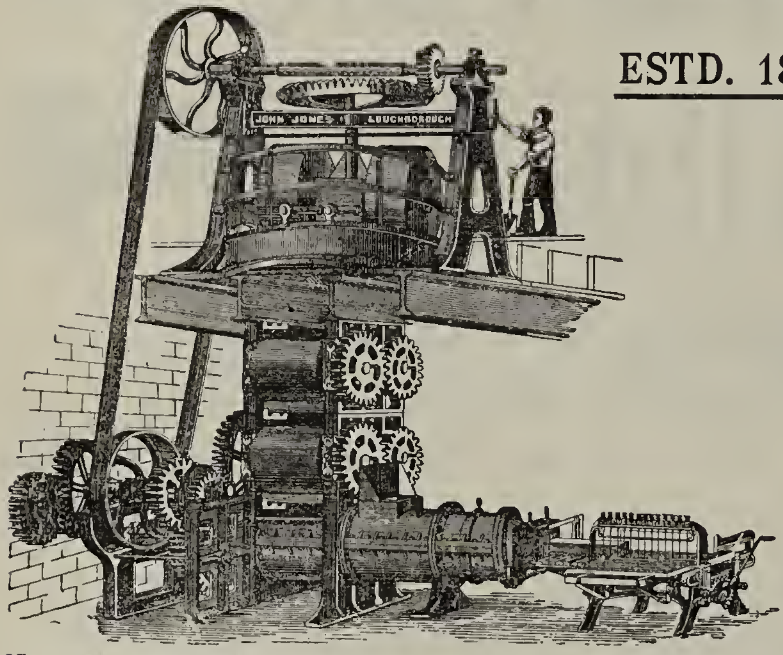
Messrs. A. R. BULLIVANT & SONS,
Moston Lane, Blackley, Manchester.

Manufacturers contemplating the erection of New Kilns should write for full particulars to the undersigned Patentees, who have had 30 years' practical experience in Brickmaking and Burning, and are in a position to thoroughly explain and work their system.

DEAN, HETHERINGTON & CO.,
WALL GRANGE,
STOKE-ON-TRENT, STAFFS.

THE "BRITANNIA" BRICK MACHINES

ESTD. 1830.



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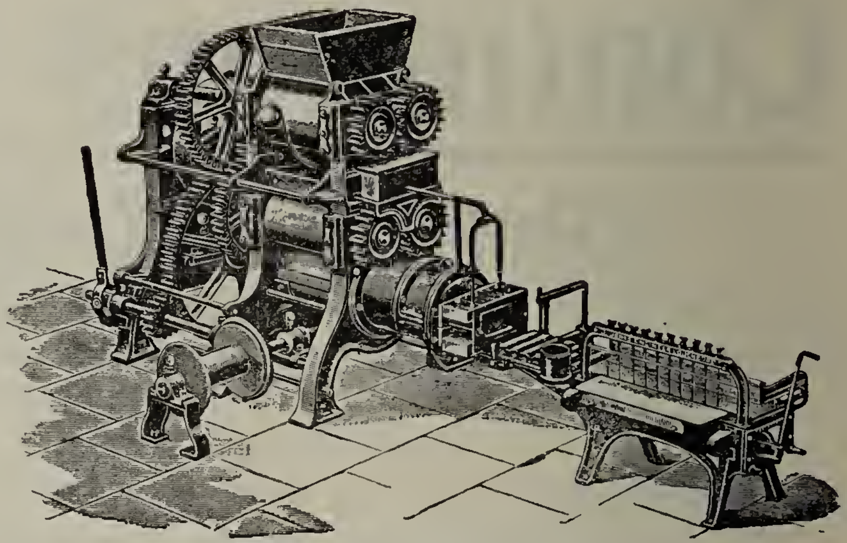

No. 2 Machine, 10,000 to 12,000 per day.

ARE BUILT TO ANY CAPACITY.

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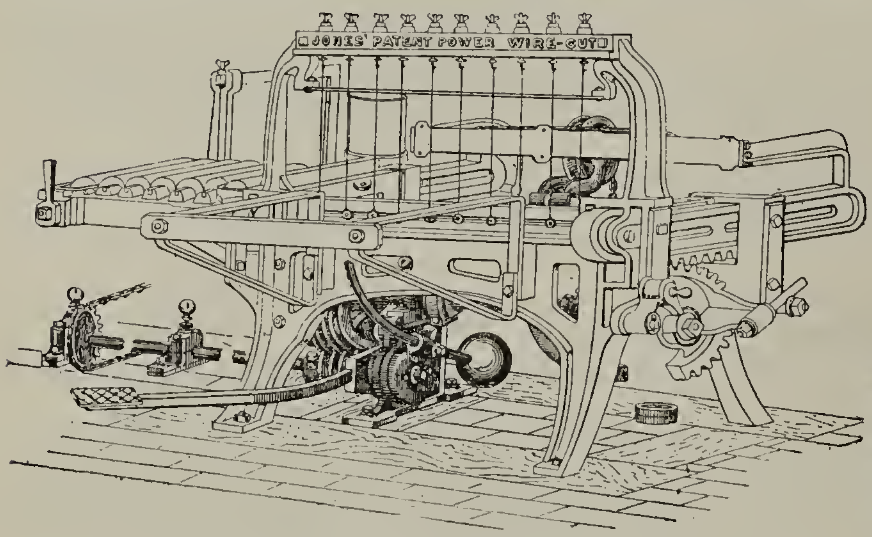
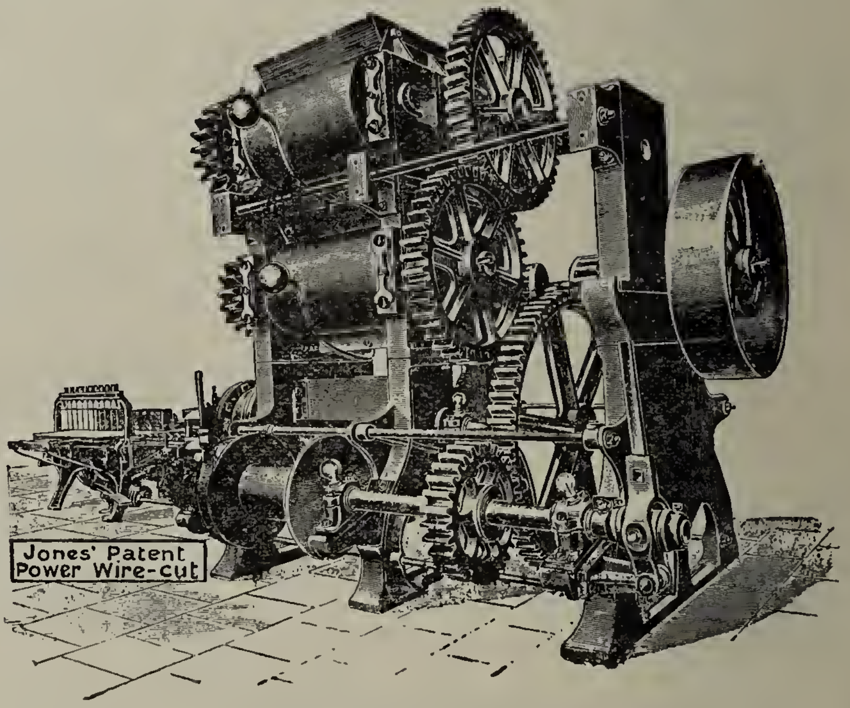


Wire-cut Framing without Wood-work.

Our Patent Power Attachment can be applied to your present Wire-cut, and saves a man at the handle end



No. 4 Machine, 20,000 to 30,000 per day.

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Specialities:—

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Wire Screening AND Perforated Plates IN ALL Metals AND Meshes

PATENT STEEL BELTING for ELEVATORS AND CONVEYORS

Screens Riddles Sieves &c

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WIRE MANUFACTURERS
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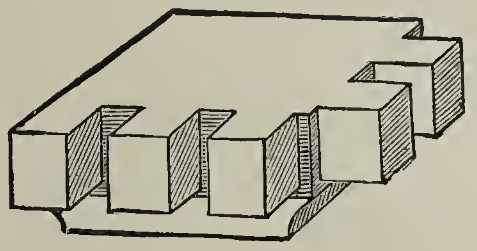

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ORNAMENTAL BRICKS TO ARCHITECTS' DESIGNS
RED PRESSED AND SAND STOCKED FACINGS.

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Machines for—
FIRE-PROOF BRICKS, SOCKET PIPES, TILES,
MOSAIC PLATES OF CLAY & CEMENT WAINSCOT PLATES,
BALL-MILLS, STONE-BREAKERS, CRUSHING-MILLS,
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Sole Agents for TH. GROKE, MACHINERY WORKS, MERSEBURG.

THE LAW.

Bricks according to Sample.—William S. Coleman, brickmaker, of West Hoathly, sued B. Marston, builder, of Freshfield Place, for £46 1s. 6d. for bricks supplied. There was a counter-claim for £11, because, as it was alleged, the bricks were not up to sample. The defendant paid £35 into court. It was alleged that a large quantity of the bricks were not "clamp" bricks, and according to sample, but this was denied, and it was suggested that some of the condemned bricks came from other yards than that of the plaintiff, whose contention was that no warrant was given. His Honour disallowed the counter-claim, and judgment went accordingly in favour of the plaintiff.

The West Bromwich Dispute.—In the Court of Chancery Mr. Justice Kekewich heard a motion brought by Hamblet's Blue Brick Company, of West Bromwich, against Mr. Townsend, for the alleged removal by the latter of certain marl from the plaintiffs' land.—Mr. Upjohn, Q.C., who appeared for the plaintiffs, said that the parties had come to an arrangement on every point except one. That point, he anticipated, would also be settled. Under these circumstances the learned counsel proposed that the motion should be treated as the trial of the action, and that agreed minutes should be signed. Mr. Justice Kekewich said he would assent to this course provided the parties could agree as to the minutes.

Breaches of the Factory Acts.—At Ashby Police Court, John French Neal, brick manufacturer, Heather, was summoned at the instance of Mr. G. Sedgwick, H.M. factory inspector, for employing a lad named Parry, under the age of 14 years, contrary to the Factory Acts.—Mr. Sedgwick said he saw Parry at work on June 22nd, and found that on the previous day he had worked from six o'clock in the morning to five in the afternoon, with 1½ hours off for meals. The inspector added that there seemed to be an impression that if a boy passed a certain standard they could go to work at any age. That was contrary to the Act, which provided that they could not be employed more than half-time until they were thirteen.—There was a further summons against defendant for employing R. Granger, under fourteen, without a certificate of fitness, and further with employing Wm. Ball, under sixteen, without a similar certificate.—Defendant's manager admitted the facts, and fines of 10s. 6d. in each case were imposed, amounting with costs to £4 5s. 6d.

Damaging Brick Machinery.—At the Pentre Police Court, South Wales, Anne Davies, Maggie Davies, and Ellen Davies, about 18 years of age, residing at Llwynypia, were charged with doing wilful damage to machinery at the brickyard of the Glamorgan Collieries in the locality; and Sydney Meyrick, fitter, employed at the Clydach Vale Collieries, was charged with procuring the girls to commit the act. The case against the girls was taken first. It appeared that the dates of the offences were the 4th and 8th of March last and the 6th June. The defendant Meyrick had been employed at the brickworks about 18 month ago as a foreman. For some time past the machinery was occasionally damaged, and it was a mystery to the officials who could be instrumental in putting iron bolts, screws, &c., into the working parts to damage it. The three girls who were employed at the works were arrested. Ellen told the Bench that Meyrick came to the brickyard somewhat the worse for liquor, but not too drunk to know what he was talking about. He said he would be back there again as a "boss" in two months, and he should like to give it to Mr. Gilmour, the head official. Anne Davies stated that she had been "put up to it" by Meyrick. Maggie remarked that she had nothing to say in answer to the charge. Several witnesses gave evidence that Meyrick instigated the girls to commit the offence. Mr. James Philips pointed out that Meyrick's wages were over £10 a month at the Clydach Vale Collieries, whilst he only earned between £5 and £6 at the Glamorgan Collieries; consequently it seemed hardly likely that he could be desirous of being reinstated or jealous of the foreman that had succeeded him. The three female defendants and Meyrick were committed to the Assizes, the latter being admitted to bail, himself in £50 and two sureties of £25 each, and each of the former in sureties of £10 each. One of the girls fainted at the close of the hearing and was carried out of court.

A Dublin Appeal Case.—In the Court of Appeal, before the Lord Chancellor, Lord Justice Fitzgibbon, and Lord Justice Walker, judgment was delivered in the case of Boylan v. Cummins. The action was brought by Patrick Boylan, butcher, William Street, Dublin, against Cummins, who is an accountant, and a civil engineer named Smith, for the purpose of having a deed of partnership set aside, which deed provided for the carrying out of certain brick works upon the lands of Kimmage belonging to Boylan. In the statement of claim plaintiff alleged that Cummins had sought his acquaintance in the train travelling from Bray to Dublin for the purpose of getting up the partnership deed. He further alleged that he did not understand that Smith was to be a partner with them; that there was a mistake as to the terms of the contract, and also that the deed was drawn up without independent professional advice. The Vice-Chancellor dismissed the action with costs, on the ground that the plaintiff had failed to established the case of fraud which he sought to make against Cummins. Boylan appealed from that decision, and it was on that appeal that judgment was now delivered. The Court held that although no fraud whatever had been proved against Cummins, a mutual mistake had occurred in the drawing up of the partnership deed, and that as the parties had never agreed as to the terms of the partnership deed, there was really no contract between the parties. They therefore declared the plaintiff entitled to have the deed set aside and cancelled and the partnership dissolved. As far as Boylan and Cummins were concerned, they should pay their own costs, but in the case of Smith the Court ordered that he should be paid by Boylan all moneys expended by him, his costs, in both courts, and also his salary at the rate of £100 a year from the execution of the deed to the repudiation of it.

"Best Blue Pavers."—At Stoke-on-Trent County Court James Alcock and Nele Loring, trading as the Etruria Tileries Company, Etruria, sued Charles Henry Holmes, brickmaker, of Crewe, for £33 5s. 10d., for goods sold and delivered. The plaintiffs' case was that on January 2 they received a letter from the defendant asking for a quotation for "best blue pavers," and as the result of negotiations he gave an order in writing for 50,000 bricks. Delivery began on February 28, and continued until April 29, during which time 14,895 bricks were delivered, and the amount sued for was the value of them. On March 8 defendant wrote to the effect that he regretted to say that the borough surveyor of Crewe had rejected the bricks, saying that the blue was only dusted in or slipped, and would soon wear away. The defence was that the bricks were not best blue pavers, and were not reasonably fit for street paving purposes. It was also contended that the contract was subject to certain stipulations, one being that the bricks were to be suitable for a contract defendant had with the Crewe Corporation, and that they were to be to the satisfaction of the borough surveyor. Mr. G. E. Shore, borough surveyor of Crewe, for the defence, said all he did was to suggest that defendant should get a better brick, adding that it was no concern of his where they came from, so long as they were satisfactory. His Honour Judge Jordan said he was glad that this explanation had been given. Mr. Shore's action was very creditable to him. It was especially satisfactory, in view of the commotion going on in the country concerning people in the position of the witness taking commissions. His Honour held that the contract was simply to supply best blue pavers, and that that contract had been substantially carried out. Judgment was given for the plaintiffs for the amount claimed with costs.

NEW COMPANIES.

Fire Brick and Tile Company, Limited.—Registered with a capital of £10,000 in £10 shares. Object sufficiently indicated by title.

Knutton Tileries Co., Ltd.—Capital £3,000 in £5 shares. To carry on the business of brick and tile manufacturers and merchants, potters, &c.

The Ravenshall Coal Company, Limited, 52, West Nile Street, Glasgow.—Capital, £32,000 in £10 shares. To carry on the businesses of coalmasters, brick, tile, and pottery makers, quarrymasters, &c.

Barnacle Hall Brick Works, Limited.—Capital, £3,000 in £1 shares. To acquire the business carried on by Thomas G. Golby at Barnacle, Warwick, and deal in mineral substances. The first directors (to number three) are to be appointed by the subscribers. Remuneration, as fixed by the company.

The Durrow Brick & Tile Works, Limited.—Offices, Tin Ware Estate, Queen's County. Capital £30,000 supplemented by an issue of £10,000 worth of 5 per cent. debentures. The works, engine power, kilns, and machinery, together with the rolling stock, tools, &c., will be taken over, and the business sold to the company as a going concern.

Bottisham Lode Mill Cement Company, Limited.—Capital, £2,000 in £1 shares. To manufacture and deal in lime, cement, bricks, &c., and to adopt an agreement with Bertha Rushton. The first directors (to number not more than five) are: F. T. Rushton and T. A. Wallis. Qualification, 50 shares; remuneration, £100 each per annum.

Thomas Gibb & Sons, 45, West Nile Street, Glasgow. — To acquire and work the quarries and brickworks now carried on by Thomas Gibb & Sons, Auchinlee, Bishopriggs, and elsewhere, and for that purpose to enter into an agreement with Thomas Gibb & Sons. Capital £60,000 in 7,000 preference shares of £5 each, and 5,000 ordinary shares of £5 each.

Kingston-on-Soar Gypsum Company, Limited. — Capital £18,000 in £10 shares, to acquire certain gypsum works and other property at Kingston-on-Soar and West Leake, Nottingham, and to adopt an agreement with Baron Belper, and to carry on the business of gypsum, cement, plaster, &c. The subscribers are to appoint the first directors. Remuneration as fixed by the company.

Knutton Tileries Company, Limited.—Capital, £3,000 in £5 shares. To carry on the business of brick and tile manufacturers and merchants, potters, &c. The first directors—to number not less than three nor more than five—are W. A. C. Benson (chairman), Samuel Proctor, G. P. Street, John Macham, and George Podmore. Qualification, £100. Remuneration, £25 per annum, divisible. Registered office: Silverdale, North Staffordshire.

Humber Brick and Tile Company, Limited.—Capital, £5,000 in £1 shares, to acquire the business now carried on by Edward S. Annison, at New Holland, Lincolnshire, under she style of The Humber Brick and Tile Works, and at Holderness Road, Kingston-upon-Hull. The number of directors is not to be less than two nor more than five; the first are Edward S. Annison and James W. Gibson; qualification, £50; remuneration, £20 each per annum.

Great Crosby Machine Brick Works, Limited.—Capital £10,000 in £1 shares, to acquire the business carried on by E. Peters, at Great Crosby, Lancashire, and to carry on the business of iron, brass and metal founders, machine and engineering tool makers, fitters, engineers, &c. The number of directors is not to be less than three nor more than seven; the subscribers are to appoint the first; qualification £100; remuneration £50 per annum divisible.

James Smith & Sons (Norwood), Limited.—Capital, £100,000 of which £60,000 is in six per cent. preference, and £40,000 in ordinary shares, each of £1. Subscriptions are now invited for 56,000 of the preference shares, the vendor taking the whole of the ordinary shares and 4,000 of the preference in part payment of the purchase price of £81,000. The profits for the two years and eight months to March last amounted to £28,728 all told. The business includes that of builders and brickmakers at South Norwood.

Havard Brothers, Limited.—Capital, £5,000, in £1 shares. To acquire the business of a mineral water and clay pipe manufacturer, now carried on by David W. Havard, at Charles Street, Tredegar, in the county of Monmouth; and to adopt an agreement with the said vendor. The first directors (to number not less than four nor more than seven) are: Saml. H. Facey, P. H. Price, Wm. Morgan and Percy J. Gosden. Qualification, £100. Remuneration, as fixed by the company. Registered office, Cambrian Works, Charles Street, Tredegar, Monmouth.

Dinas Silica Co., Limited.—Capital, £10,000 in £1 shares to acquire the business now carried on at Ynisonos, Glyn Neath, Glamorgan, to adopt an agreement between Walter de Winton, of the first part, and Thomas Williams, of the other part, and to carry on the business of brick and cement makers, &c. The subscriptions are:—James C. Gurney, 46, Simpson's Road, Bromley, Kent, law stationer; Edmund Crisp, 31, Minster Square, Regent's Park, N.W., clerk; W. H. Simpson, 37, Lupus Street, St. George's Square, S.W., clerk; F. H. Durrant, Willow Lodge, Isleworth, Middlesex, articled clerk; H. G. Rastall, 5, The Broadway, West Norwood, London, gentleman; F. C. Powell, 248, Haydon Road, Wimbledon; F. W. Trehearne, 5, Haven Green, Ealing, clerk. Registered without articles of association.

COMPANIES' MEETINGS.

Seaton Brick and Tile Co., Ltd.—At the 16th annual meeting of the shareholders of the Seaton Brick and Tile Company held on June 21st in the Douglas Hotel, Aberdeen, a dividend of ten per cent. on the paid-up capital was declared. A sum of £500 has also been set aside for depreciation, and £500 has been added to the reserve fund. On the motion of the chairman (Mr. R. G. Wilson), seconded by Mr. George Gregory, Stonehaven, the directors' report was adopted.

The British Clayworkers' Mutual Insurance Corporation, Limited.

SIX POINTS TO REMEMBER.

I. Was formed as a protest against the high rates charged to the trade.

II. Can still give quotations as low as any other company.

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VI. It is taking new business every day.

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A C B Code, Fourth Edition.

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TO BRICKMAKERS, CONTRACTORS & OTHERS. BRICKFIELD for SALE within 40 minutes of London, close by a station on the Great Eastern Railway, containing 16 acres of good Brick Earth, a good House, Brick Kiln, Sheds, Engine, Pug-mill, and all Working Plant complete, and is in good working order. Possession can be had at once.—Address H. B., c/o *British Clayworker*, 43, Essex Street, Strand, W.C.

BRICK WORKS, about 35 ACRES FREEHOLD, close to London. Clay inexhaustible, now making excellent Sand Facings and Wire Cuts. An exceptional opportunity of acquiring a genuine going concern which offers unlimited means of extension.—Apply to the Messrs. LUMLEYS, of St. James's House, 22, St. James's Street, London, S.W.

FOR SALE (Cheap), SMALL WELL-EQUIPPED FITTING SHOP, with STEAM POWER, in Midlands, near large number of Brick and Sanitary Tube Works.—Apply "N," *British Clayworker*, 43, Essex Street, Strand, W.C.

RED BRICK CLAY.—110 ACRES of CLAY suitable for first-rate Red Bricks TO LET on Royalty; or a reasonable offer for Freehold would be entertained. Water carriage. Freight to London, about 4s. per thousand.—Address "Freehold,' *British Clayworker*, 43, Essex Street, Strand, W.C.

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EXCEPTIONAL CHANCE FOR SMALL CAPITALIST.—Bed of Clay, about 1½ acres, in rising neighbourhood, two or three miles from Bristol; Complete Modern Semi-dry Press Brick Plant and Steam Power on ground; site situated on main road and constituting a good building speculation.—Particulars, address "Clayworker," c/o Davies, Advertising Agent, Bristol.

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FOR SALE.—FREEHOLD AND PARTLY LEASEHOLD BRICKWORKS (lease yet to run 63 years), situate in Warwickshire, in a populous district, where the demand for pressed and facing wire-cuts, and other Red and Blue stuff is enormous. Fitted up with modern machinery, perforated and solid bottom pans rolls and mixer on pug, driven with 25 horse-power engine and, boiler. There is a plentiful supply of water; the drying shed is 45 ft. by 105 ft. There are round and square Kilns. The Clay is 40 ft. deep —21 ft. Red and the remainder Blue—the former turning out stuff equal if not better than Ruabon Red, the latter as good as Staffordshire Blue. In connection therewith, and on the same property, is a small Colliery for the supply of fuel for the works; the coal is specially suitable for brickburning purposes; it is a virgin seam, and is 3 ft. 6 in. in thickness, under which is a seam of Fireclay 5 ft. 6 in. thick, which turns out some of the finest fire stuff, and also makes beautiful glazed bricks. The demand, also, for coal and slack in the neighbourhood is very great. The surface of the property brings in £35 to £40 per year. There is also a bed of sand on one part of the property, 21ft. thick; the sales from this per month have realised £14. The frontage to the main road (Freehold) is 80 yards, and Leasehold 22 yards. The adjoining frontage has just been sold for building sites at 3s. 5d. per yard. This is one of the rare properties met with in the Brick Trade, and is a thorough sound investment, everything being on the "SAME" property for the complete manufacture of the various clay goods. Only principals or their solicitors dealt with — Address, "M.E.N.," *British Clayworker*, 43, Essex Street, Strand, W.C.

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WANTED TO PURCHASE, a BRICKWORKS PLANT complete.—State full particulars and lowest price to Atlantic Engineering Works Co., Newport, Mon.

PRESSES suitable to press Wire-cuts direct from Machine, at the rate of 20,000 a day. Machine men please reply.—Apply "Press," c/o *British Clayworker*, 43, Essex Street, Strand, London, W.C.

FOR SALE, PLASTIC BRICK MACHINE, with or without Crushing Rolls, producing 20,000 Bricks daily; extra strong design; special features; references can be given.—For photos, prices, &c., apply J. Davis & Co., Chester Park, Kingswood, Bristol.

FOR SALE, Whitehead's No. 8 BRICK-MAKING MACHINE, double side delivery, capacity 20,000 per day, consisting of mixer, two pair rollers, pug mill, two cutting-off tables and hauling gear attached. Practically new.—Apply, No. 456, c/o *British Clayworker*, 43, Essex Street, Strand, W.C.

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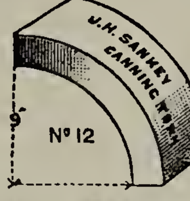

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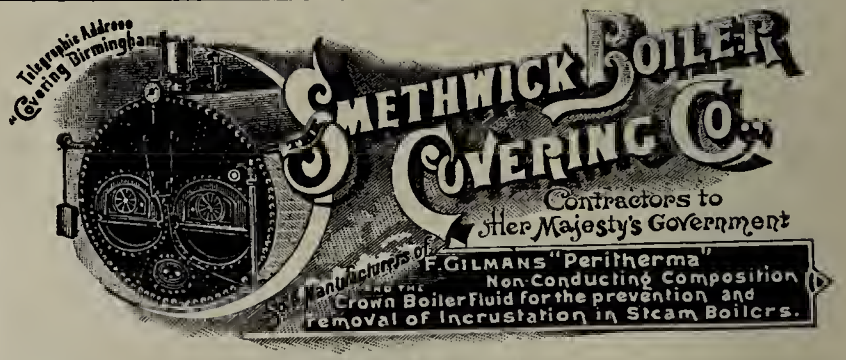
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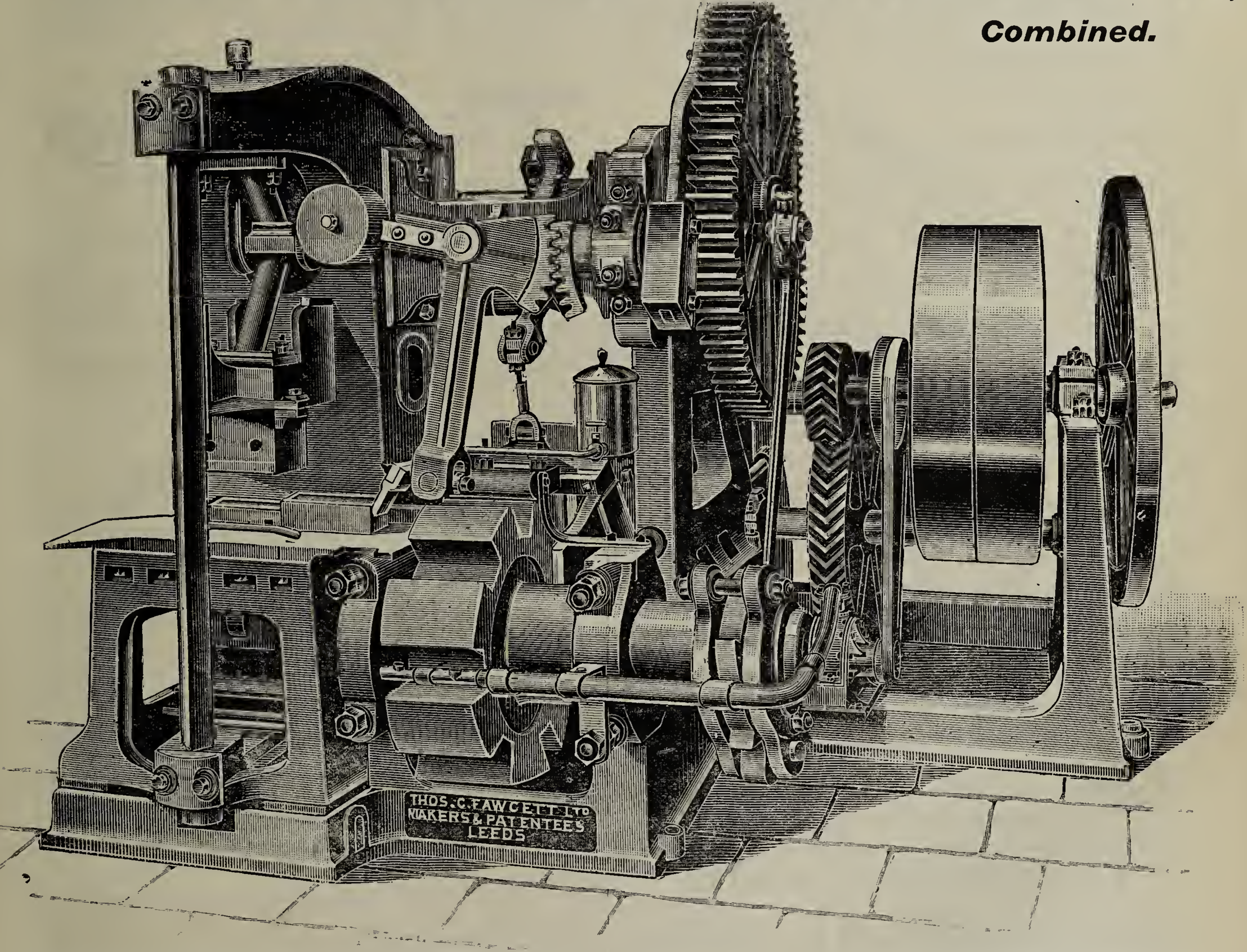

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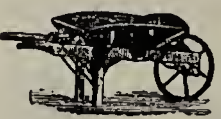

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THE BRITISH CLAYWORKER.

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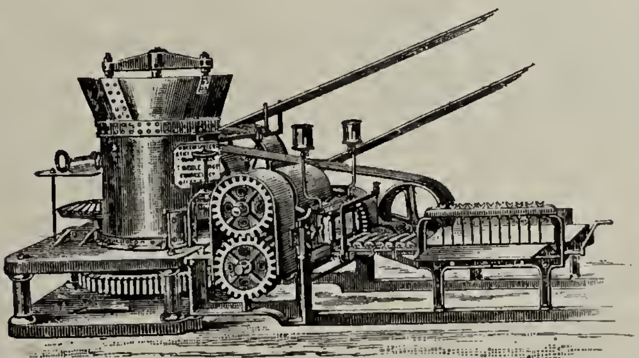

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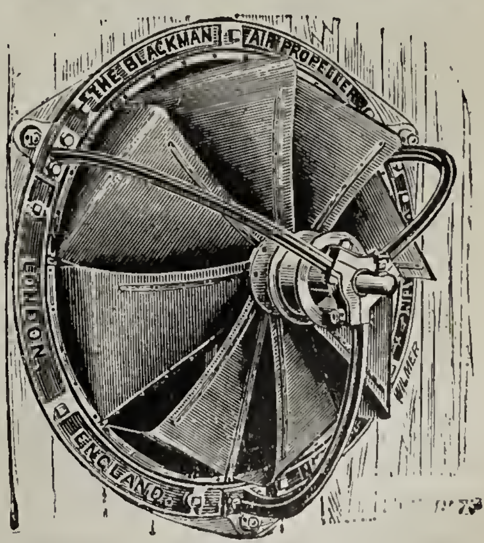

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BY THE WAY.

Brickmakers have proved of what stuff they are made in resolutely holding together in the matter of Mutual Insurance. We understand that, of the many hundred insurances effected, only a dozen defections have taken place, and the majority of these pay less than £5 premium. In view of the fact that insurances may now be effected for nothing at all with some of our competitors, it speaks well for the trade that the B.C.W. Mutual Insurance Corporation has not only kept its old insurers, but is doing new business at its own price. Never were the smashing price companies so completely sold. Those brickmakers who have supported them will probably themselves be sold in due time.

* * *

A short time ago we published an article treating upon the future of stock brickmaking, what time the London Vestries should be utilising their own refuse. One of the most populous of London quarters is the Mile End, and here the Vestry surveyor has earned for himself the title of the "Golden Dustman." The profit, made from the supply of ashes, &c., to the brickmaker, is some slight indication of the activity in stock brickmaking during the past three years. In 1897 the refuse of Mile End brought £580 into the parish coffers; in 1898 the amount was increased to £1,471, and during the past year it has reached as much as £1,614!

* * *

Those malicious persons who give expression to their feelings in damaging brick machinery are possibly unaware of the penalties they may incur. In a recent case tried at Swansea, the judge told the prisoners they were liable to penal servitude, while the lightest possible sentence he could inflict was fourteen days' hard labour. When this fact becomes more generally known it may act as a deterrent to this class of crime. There have been several bad cases reported recently, and the terror of the law is the only thing that makes a would-be miscreant hesitate.

* * *

A well-known church dignitary, in addressing a company of brickmakers a short time since, charged them to drink plenty of beer. There was nothing like it in the world, he said, and we have no doubt that there were few dissentient voices in the gathering. The brick hand can generally give points to most workers in the matter of drinking at this time of year, and he is hardly likely to slacken his efforts now that his accomplishment has received priestly benediction. But we are not so sure that the masters are in general agreement as to the beneficial effects of unlimited quantities of our national beverage on their employees.

* * *

A find of considerable interest just acquired by the Natural History Section of the British Museum is a fossil bird recently discovered in the Isle of Sheppey in a large nodule of London clay. The remains, consisting of skull, pelvis, thigh-bone, and shoulder-bone, have been carefully worked out of the clay and determined by Mr. C. W. Andrews, of the Geological Department, to be a hitherto unknown form of the Order Steganopodes (now represented in this country by the gannet, cormorant, and shag), in which all the four toes are united by a web. It is believed to be allied to the frigate-bird and the tropic-bird, both of which are now almost confined to the tropical regions.

* * *

It is not only brickmaking that is in the ascendency just now. A correspondent tells us that the Devon china clay industry maintains not only a surprisingly high level, but is making an upward tendency. This is especially the case in the Teignmouth district, where in the near future it is confidently expected a big shipping business will be done from the quay extension. As an evidence of the present extent of the trade it may be mentioned that one merchant alone shipped over twenty thousand tons last year.

* * *

One of the perils it was thought the introduction of the Workmen's Compensation Act would bring about was the preferment of bogus claims by workmen. Happily they are rare, but a recent case tried at the Birmingham Assizes shows that, unless considerable vigilance by employers is shown, there is every possibility of the perpetration of fraud. In this case a workman alleged that a hammer fell upon him and broke his rib. It was subsequently proved that the injury arose from a fall at his home, and that he had suborned a fellow-workman to support his statement. The sentence was a very heavy one —two years' imprisonment with hard labour—and this will doubtless act as a deterrent to bogus claims in the future. In any case it will put the employer upon his guard against what might be made an easy form of malingering.

* * *

The chief of the Maryland Geological Survey has issued a useful Report dealing amongst other things with the building and decorative stones of the State. The tests enumerated are interesting, and one of them, though not quite novel, might very well be extended to the examination of bricks We allude to the tests as to permanence of colour. The change of colour in a brick, on exposure, is due mainly to a change in the form of combination of the iron, when that is present; and although after the burning of a brick the iron present is often too much engaged to yield seriously to atmospheric influences, yet in a very common class of brick, in which the burning has only been of a somewhat perfunctory character, the iron still remains in a condition ready to be altered. This latter class are amongst those bricks liable to change tint on exposure. In the experiments mentioned an artificial atmosphere to accelerate oxidation was produced, the tests extending to a period of seven weeks. This atmosphere was changed, so to speak, by being confined under a glass bell in which were placed some nitric acid, hydrochloric acid and black oxide of manganese—the specimens to be tested being placed under the bell also, standing over a pan containing hydrochloric acid. At the conclusion of the tests the specimens were washed and the difference in colour, if any, noted. We submit that, on a larger scale, bricks, terra-cotta, &c., might be similarly tested, especially in cases where the architect is doubtful as to whether a brick proposed to be employed will really retain its colour, or not, when placed in an exposed situation.

THE BRICK-EARTHS OF GREAT BRITAIN.—XXV.

Wansford District.

The most important brick-earth in this district is largely covered over with drift deposits; nevertheless it crops out at several localities, and is of great economic interest to the clayworker. We allude to the clay in the uppermost portion of the Lias formation. This is the first time we have had occasion to allude to this formation, in this series of articles, and it will therefore, be convenient to say something concerning the deposit generally.

Classification of the Lias.

Midford Sands.

Upper Lias {Clays with cement stones.
Limestones and clays (basement beds).

Middle Lias {Marlstone and sands (rock bed and ironstone).
Micaceous clays and sands.

Lower Lias {Clays with occasional bands of limestone.
Limestones and clays.

It will be noticed that the uppermost division represented in this classification, the Midford Sands, are not definitely bracketed with the Upper Lias; strictly speaking they form "passage beds" to the formation above, viz.:—the Inferior Oolite. In the Wansford district the Inferior Oolite is to some extent paralleled by the beds beneath the Great Oolite Limestone (see map, fig. 1) and above the Upper Lias Clay, but the Midford Sands, properly so called, are only met with in the West of England, particularly in Somersetshire.

The Lias formation has a great extension in England. Its outcrops are found in north-east Yorkshire at Redcar and neighbourhood, and then creeping southwards, with an almost unbroken line to the Humber, it is continued on the other side of that river, through Lincolnshire by Lincoln and Stamford, south of which place its outcrop greatly expands to the Eastern Midlands, especially at Rugby and Northampton. Passing westwards, still with an outcrop many miles in breadth, it attains the eastern part of Gloucestershire, and then narrowing it goes to the east of Cheltenham, skirting the Cotswold Hills to Bath and Bristol. It has a considerable outcrop in Somerset, and runs down to the English Channel in the west of Dorsetshire, in the neighbourhood of Lyme Regis.

It is one of the best-known of English geological formations, owing to the occurrence of enormous saurian reptiles at several points, noticeably at Street in Somerset and Barrow in Leicestershire. There seems to be a peculiar fascination about *Ichthyosaurus* and *Plesiosaurus*, and even amongst the unscientific public they are known by name. The average "bricky" in the innumerable yards in the Lias up and down the country knows these reptiles as well as anybody. The daily paper leader writer likes *Ichthyosaurus*, first because it sounds learned, and secondly it is such a convenient name to hurl at the head of some unfortunate (or fortunate) individual when the dictionary does not contain some other word sufficiently explicit to describe the degree of opprobrium desired. The clayworker will be interested in the following conversation which we overheard in the Natural History Museum the other day. Father and son are standing in front of the fossil remains of the last-mentioned reptile.

Son. Father, what's that thing?

Father (learnedly). That, my boy, is an *Ichthyosaurus*.

Son. And what is that?

Father (reflectively). A dragon, my boy.

Son (after a pause). Do you believe in dragons?

Father. Yes, certainly—look at all these.

Son. Say, guvner, you'll have to go to school again, that's all rot. These remains are included amongst the reptilia and are remarkable for the enormous size of the orbit, which is partially ossified; notice, again, the abnormal development of the premaxilla and mandible. (Collapse of paterfamilias.)

The clays of the Lias formation have yielded excellent clay goods from time immemorial. Bricks, tiles, drainpipes, flower pots and chimney pots are amongst the chief products. The clays are almost everywhere fairly stiff; but do not yield much water, and shrinkage in the kiln, in spite of the fatness, is not so remarkable as might be supposed. Nearly all the goods made are red, the temperature to which the clay is subjected not being high enough to cause much yellowness except at certain points to be hereafter noticed. The chief reason for the comparative non-contraction is perhaps the presence of lime, which in greater or less quantity is practically ubiquitous in the formation. When subjected to a sufficiently high temperature this lime acts as a flux to the siliceous sand grains found sparingly in the clay, and tends to greater toughness and uniformity. In certain localities, as, for instance, at Rugby, the clays and shales contain about 30 per cent. of calcium carbonate, and are not particularly suitable for brick manufacture, though in the same district, not far off, as at Hill Moreton, the Lias clays furnish a good class of brick.

Again, in certain localities the clays contain "race" and plenty of shells, which are calcined on being burnt, and by the liberation of the carbonic acid gas cause the bricks to blow, and the latter are then always unsatisfactory. Speaking generally, however, the Lias clays are amongst the best of the country for supplying good all-round clay goods, including excellent bricks. At the same time many localities where the clays crop out are still unknown to the brickmaker, or, at any rate, are not drawn upon.

The district chosen for description in this article (see map, Fig. 1) is of interest also as yielding three other clay horizons, all of which are suitable for brickmaking. A glance at the section (Fig. 2) shews the mode of occurrence or order of succession of these, viz.:—The Upper Estuarine Clay (see last article, p. 97 *ante*), the Great Oolite Clays and the Oxford Clay. All these clays are close to rail, and the whole area depicted in the map is well served in that respect. All the same, there is very little brickmaking done considering the wealth of material. This is in part due to the circumstance that the drift masks the outcrops in several localities. But our map shows this latter denuded and exposes the position of the "solid" beds beneath.

FIG. 1

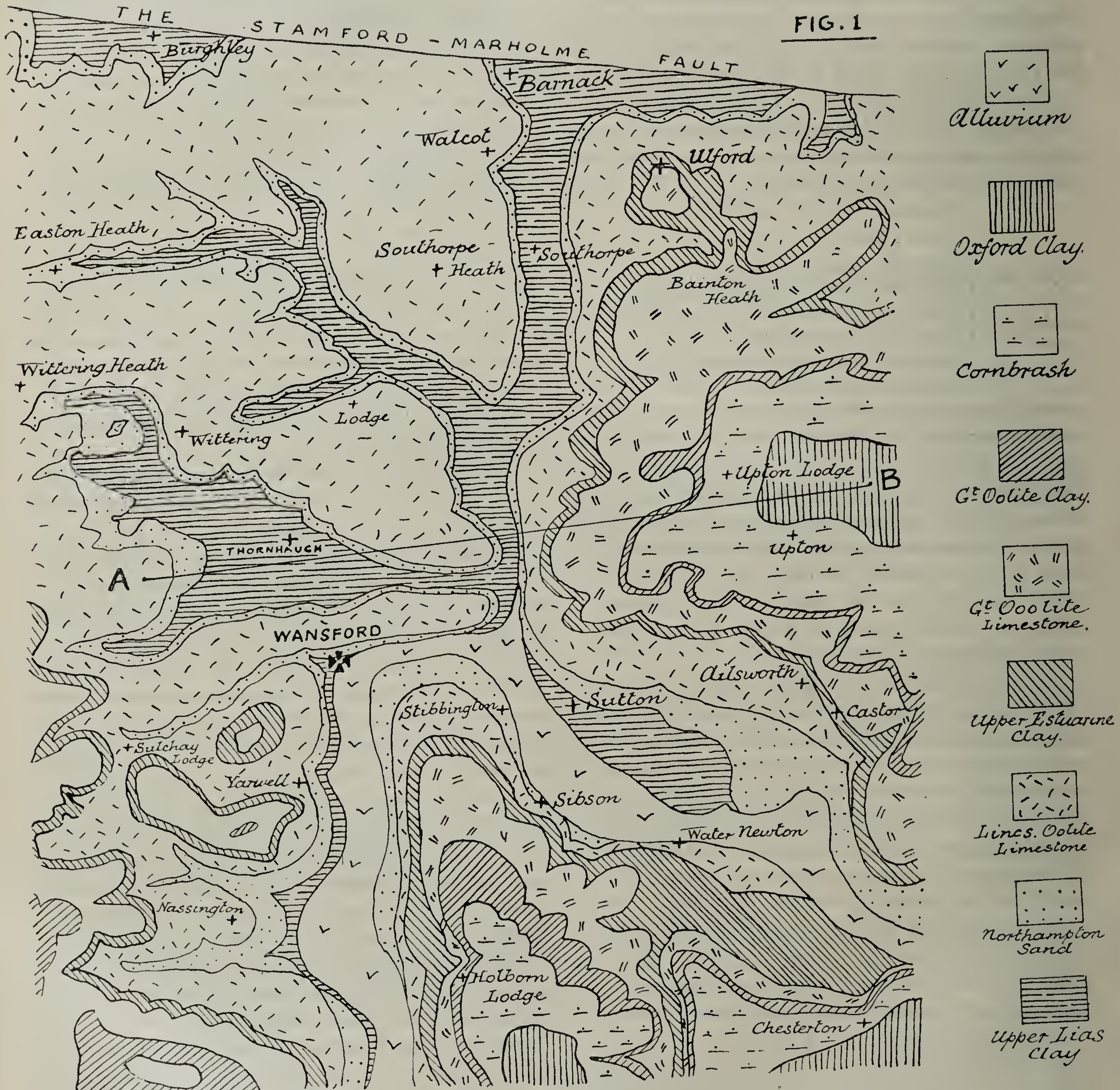

Fig. 1.—Sketch Map of Brick-earths, &c., in the Wansford District.

The Lias clays in the Wansford district occur (1) bordering the river (denoted by the alluvium on the map) south of the town, (2) in a roughly triangular area of which Thornhaugh is near the centre, (3) a narrow spit running from near Wansford to Easton Heath, (4) another branch runs northwards from near Wansford to Barnack, (5) a small

FIG. 2.

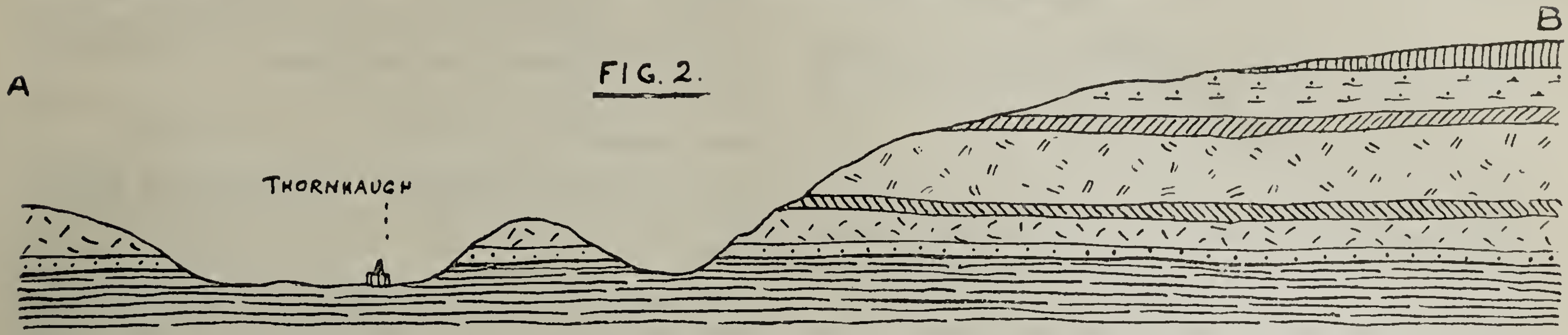

Fig. 2—Section along the Line A B in Fig. 1. (The symbols indicating the different geological horizons are the same in both figures.)

patch at Burghley House, and (6) a still smaller outcrop to the east of Ulford. Both 5 and 6 are brought to an abrupt ending by the fault which runs from Stamford by Barnack to Marholme.

The general character of the Upper Lias in the district is as follows. The formation consists almost entirely of clays, but these latter are of divers kinds. One division is made up of finely laminated, blue shales, with bands of flat nodules composed of argillaceous limestone of a blue colour, but weathering white. These beds split up under the action of frost. Above these is a series of firmer clay beds, with layers of limestone nodules of coarse texture. Then follows about 100 feet thick of dark-blue clays with large quantities of pyrite and jet. Professor Judd remarks that when exposed to the atmosphere these clays become light-coloured, and exhibit much selenite with numerous bands and concentric balls of hydrated peroxide of iron, formed by the decomposition of nodules of iron pyrite The highest beds of the Upper Lias consist of clays with numerous layers of septaria. These latter are well exposed at Thornhaugh (see map, Fig. 1)—near which place a well was sunk for upwards of 70 feet in the blue clays without reaching the bottom. It is estimated that the total thickness of the Upper Lias in the district is at least 200 feet.

In selecting a site whereon to open up a brickyard, the greatest care should be taken to ascertain which of the horizons above mentioned are exposed at the spot. The shaly beds with flat nodules might be left alone, for instance, where the immense blue clays are so well developed. The highest beds, with the septaria, are no doubt the best for brickmaking, as the beds beneath contain much more pyrite and small concretionary nodules which are not only a great nuisance and expensive to move, but tend to discolour the brick. The presence of selenite (hydrous sulphate of lime) also is not favourable to the manufacture of a good brick unless it be ground exceedingly fine. Its action in the kiln is very similar to that of small pebbles of limestone, and even where the brick does not "blow" as a result, the surfaces will not be of regular tint. Care should therefore be taken to select a position in this great mass of clay which is comparatively free from these small white crystals. Although in practice no marine clays are quite free from selenite, there is a comparative absence along certain horizons. Nothing but careful examination of the outcrops of this Upper Lias clay can satisfactorily determine such a point as this, the pyrite, selenite and nodules being capriciously distributed over a wide area, though persistent enough locally.

All along the outcrops in the valley of the Wansford Brook, where the Upper Lias is much hidden by the alluvium (especially between Wansford and Fotheringhay), we find nothing but the highest division exposed—namely, the firm clay with numerous layers of septaria. This is an excellent horizon, for the septaria are large and are readily removed.

The Northampton Sand (see Map) is a ferruginous deposit, and contains altogether too much iron to fit it for mixing with the clay. As a rule, an iron "pan" separates this from the clays below.

The Lincolnshire Oolite Limestone may be passed over, for the clays of the area already contain enough lime, and this deposit, in that particular district, is not of much economic value to the clayworker.

The Upper Estuarine Clays* in the Wansford district are very poorly exposed. At Stibbington there is, however, a good quarry section shewing fresh-water clays and sands, and near Wansford Station they may be seen ; otherwise they are much covered over. At Helpstone these beds may be seen not far from the brickyard on the top of a hill. At this brickyard the Upper Lias Clay is brought up amongst the Lower Oolites, through the agency of a very sharp fold, and the dips here are as much as 30 degrees. The Lias at the last-mentioned locality is blue clay with some pyrite and occasional selenite. The bricks made are of a very serviceable character.

We need not pause to describe the Great Oolite Limestone here ; and the clays of the same series are not of much consequence, the most part being covered over by drift of considerable thickness. The Oxford Clay, so important at Peterborough, not many miles away, is here but sparingly developed, and of comparatively little interest to the clayworker.

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* For description of this formation see *ante* p. 99.

SALT-GLAZE FIRING BY SEGER CONES.

THE extended use of salt glazing as a method for the production of glazed bricks, pipes, sinks, and other sanitary goods, has arisen no doubt from the fact that no pottery material is more durable, and at the same time so cheap in its method of production. The fact that the glazing process requires no manual labour, and that the finished articles can be placed immediately in the kiln, is in itself a great economy.

The application of this method, however, to the glazing of fire-clays, has introduced an element of difficulty which did not arise in connection with the plastic clays of Devonshire and Dorsetshire hitherto used. It is true that the composition of most of the fire-clays being highly siliceous, favours the chemical reaction of the alkali in the glazing process, but it has been long since demonstrated that this chemical combination does not take place readily until the point of incipient vitrifaction has been reached. The temperature required for this naturally varies with the refractoriness of clay used. From a desire to economise, some manufacturers have lost sight of this fact, and have supposed that the mere addition of larger quantities of salt during the firing would cause a proportionate increase of the glaze upon the surface. The result has been that in many cases salt-glaze ware has been produced which has greatly discounted the merit of the material in its best form, and one is somewhat inclined to regret that one of the most intrinsically excellent materials should thus be discredited by the productions of inferior manufacturers. In place of the thoroughly vitrified body obtained from the plastic clay measures, one sees fire-clay bodies so coarsely ground that they have little cohesion ; while the firing is completed at a temperature far too low to give an opportunity of correcting this very serious fault. It is not surprising that engineers have been compelled to stipulate for a minimum of porosity, and neither is it surprising that many makers have found it difficult under their existing methods to confine this defect in their wares within the required limit. All this might to a large extent be avoided, even in the case of many refractory bodies, by the adoption of finer grinding combined with the more intelligent and careful attention to the requirements of salt-glaze firing.

It is necessary to bear in mind the fundamental principle that the body when dealt with by fire is in its most critical condition at the moment of vitrifaction. At this point it is sensitive to the effects of salt glazing to an extent which is not manifested either before or after. It is also true that at this point the character of the atmosphere in the kiln, whether reducing or oxidising, has its complete and final effect, and the action of the kiln atmosphere upon the ferruginous particles of the clay, combined with the action of the alkaline vapours of the salt upon the siliceous portions, give the varying results which so perplex the average salt-glaze burner.

If the salt is introduced into a reducing atmosphere the colour of the ware must inevitably be dark and blackish looking. Neither will any "clearing" of the smoke after salting redeem the defect. On the contrary, the salting in the atmosphere itself fully charged with oxygen will give the well-known cane-yellow colour which is connected with the best types of this ware. From this it will be obvious that much attention is necessary to two main points :—

(1.) The freedom from yellow smoke within the kiln at the time of salting.

(2.) A sufficient temperature to enable the salt fumes to combine with the clay surface of the ware when it is introduced.

Salting on the wrong fire, that is too soon or too late, has ruined hundreds of kilns of ware, which only needed a more watchful attention in this respect. Few firemen, however, understand the importance of this point, and fewer still of those who do are blessed with that facility of judging the colour of radiant heat which is necessary to gauge accurately the temperature of the kiln by the eye. It is for this reason that the adoption of the Seger Cone for salt-glaze purposes becomes specially valuable. With each particular body it will be found that one special temperature gives the best facility for the combination of the salt with the ware, and the production of a smooth and even glaze is the result. If the fireman is able to place in the kiln a Seger Cone, which, when it collapses, indicates with certainty that the time for salting has arrived at which he will inevitably obtain the most perfect glazing, an immense advance has undoubtedly been gained upon the previous methods, and the disappointment of unglazed ware would be largely obviated.

It is true that want of equality in draughts or flues blocked with rubbish may equally be the cause of irregular glazing, but these are points which simply require care to obviate them.

The use of Seger Cones for salt-glaze purposes has been neglected by many manufacturers under a mistaken impression that they should in all cases be used to indicate the *finishing* temperature of the kiln. Though this is so in other cases, the adoption of them in salt glazing is an obvious exception. It will be found that the behaviour of the cones, unless protected, is considerably interfered with by the salt. Neither is there a necessity for ascertaining the heat after salting, the chief object being to ascertain the temperature at which the salt will have its maximum glazing effect.

It is true that the introduction of salt at an early stage tends to set up the vitrifying action upon the surface of the ware, and with highly refractory clays no doubt it is the custom to salt by continuous stages after a series of fires. This method, however, if pursued too far, tends to introduce crazing of the surface, and in other ways causes an unsightly appearance of the ware. The above remarks apply still more pertinently to the manufacture of salt-glazed bricks, which, more even than stone ware and sanitary goods, demand uniformity of colour, and those who have undertaken the manufacture have too often found that the loss in this respect has been very great ; the difficulty of obtaining a high percentage of best goods has in some cases discouraged manufacturers altogether. Where Seger Cones have been adopted for this purpose it has been found possible to obtain much more perfect control over the glazing, and when this is combined with due attention to the conditions of the fire holes when salting, completely successful results are obtained.

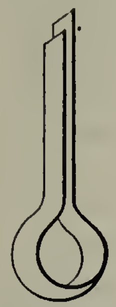
Considering the increasing approval on the part of architects of these salt-glazed bricks, it seems important that other means should be taken to produce them economically and efficiently.

WIRE-CUT BRICKS WITH FROGS.

To the Editor of "The British Clayworker."

Dear Sir,—Since reading an article in the last issue of *The British Clayworker* upon "Wire-Cut Bricks with Frogs," it has occurred to me that some further information and remarks upon the same subject might be useful.

In the first place, Mr. Cornish's Patent is, I believe, worthless—*i.e.*, as far as the patent right is concerned—for the simple reason that a piece of old hoop iron or wire bent or twisted up to shape as Figs. 1 and 2—and, with or without an old piece of rag wound round the rough ends to serve the purpose of a handle, was in use in this district considerably over 20 years ago—and, what is more, I know of a house during the reconstruction of which, some 20 years ago, a considerable quantity of bricks so made were used, and a sample of these bricks is before me now. I also saw wire-cut bricks treated in the same way between four and five years ago.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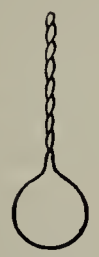
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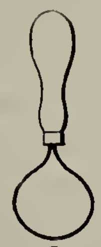
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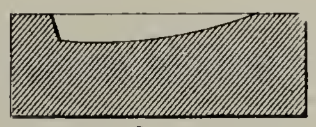
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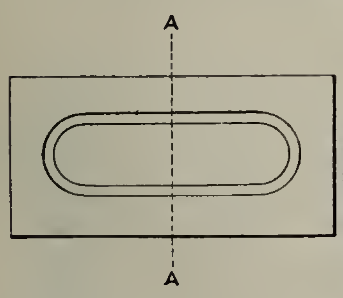
In all probability, Mr. Cornish will find out ere long—as I have done—that a tool of the hoop-iron type is not nearly so suitable for the work as is wire. The hoop iron seems to have too much surface for the clay to adhere to, and, therefore, requires very careful cleaning after every three or four cuts, or the work will be exceedingly rough—and, of course, the more sticky the clay, the worse the results.

The first tool I ever found of any real use for the purpose consisted of a hoop of ordinary wire—not coarse wire, but somewhat thicker than ordinary cutting-off wire, set in a handle as Fig. 3. It was found that an ordinary brick-yard hand was unable, even with a fair amount of practice, to use this tool in a way that improved the appearance of the goods, for some of the "frogs" were deep, some shallow—some short, others long, and some bricks even had a piece cut out of their ends; but the majority of "frogs" were of the shape as shown in section in Fig. 4. In order to improve matters, a thin piece of board was obtained of the same shape and size as the face of a brick, and in the centre of this board was cut a hole of the required dimensions and shape of the frog, and having the inside edges of this hole chamfered as Fig. 5. This board was laid upon the green brick before the tool was applied—as in Fig. 6, so that the chamfered inside edges of the board acted as a guide for the tool. This gave excellent results but was too slow.



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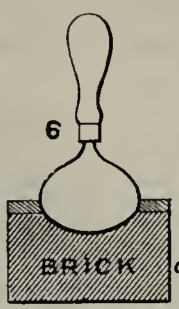

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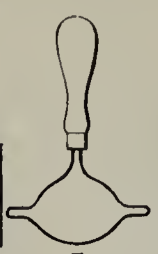
Section A.A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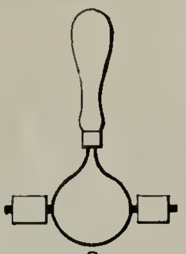
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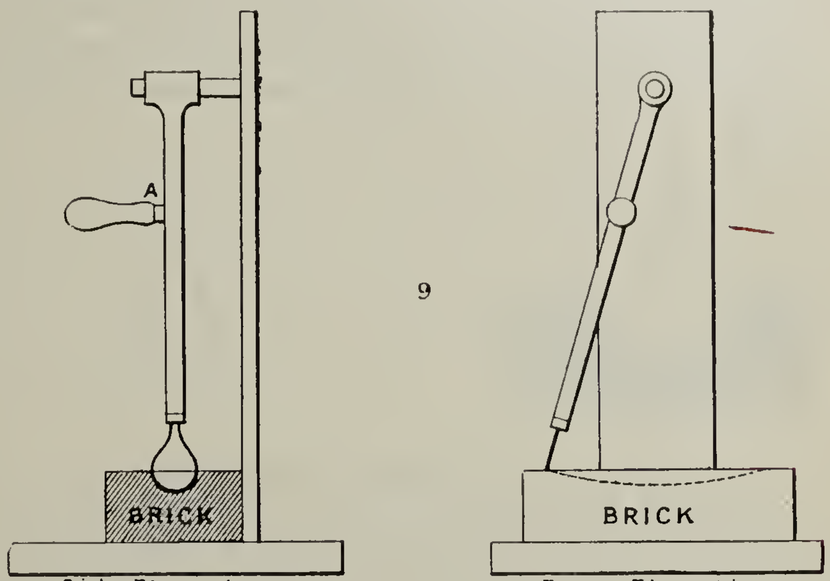
A tool was afterwards made of the shape of Fig. 7, the two horns acting as guides for depth of cut; this tool acted well, but was afterwards improved by placing small wooden rollers or wheels upon the horns, Fig. 8, which rolled upon the surface of the brick outside the frog.

Another apparatus tried consisted of a base-board and upright, from near the top of latter of which was hung a small arm on a pivot in such a way as to render it free to swing as a pendulum, Fig. 9, and on the top of this rod was attached a loop of wire, precisely as in Fig. 3. A small handle was fixed to arm at A. Upon placing a green brick in correct position upon the base-board as shown, and pulling the pendulum-rod backwards or forwards by means of the handle A, a piece of clay would be cut out of the brick by the wire loop attached to the bottom of rod. This apparatus was also tried in a horizontal position with the brick resting upon its edge, in which case the base-board was not required; this position was an advantage, as the bricks, as delivered from an ordinary cutting-off table, did not require to be turned over.



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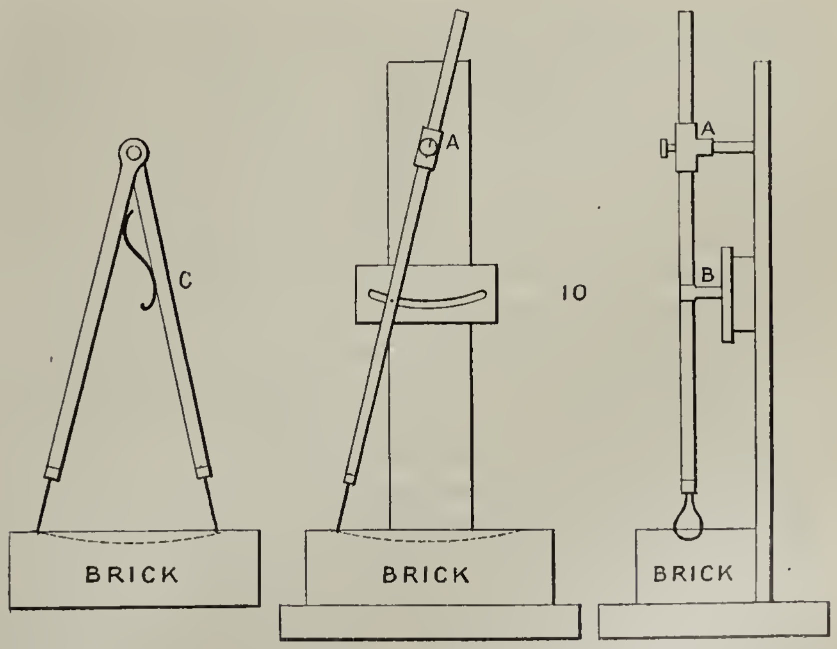
Side Elevation

Front Elevation.



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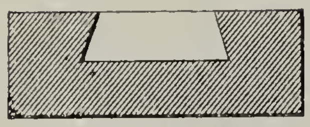
The idea illustrated in Fig. 10 consisted of a pair of legs hinged at top as an ordinary pair of compasses, but kept open or apart by means of a spring at B, and having loops of wire attached to each leg. To use, the wire loops are made to rest upon the brick and the legs grasped by the hand at about the position C and pinched together.

In order to vary the shape of the "frog," another apparatus was constructed something of the same form as Fig. 9, but in addition the rod was capable of being moved up or down through the sleeve A, Fig. 10, as well as to swing pendulum-fashion. Attached to the back of the rod was a projecting pin B, the end of which entered a slot cut in a plate attached to the upright at back. The green brick was placed upon the base board as in Fig. 9.

It will be seen from the sketch of this apparatus, that by varying the shaping of the slot cut in the guide plate, a frog of almost any shape can be cut, and it was with a tool of this description that I have cut deep holes of dovetail section in bricks as shown in Fig. 11, which were required for a special purpose.



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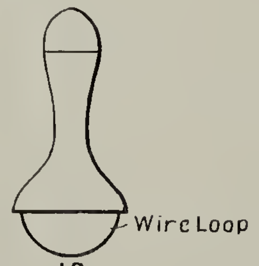


12

I have omitted to mention that in using the tool Fig. 3, it was found that a fine wire made cleaner cuts than coarse wire, and there was not the same risk in damaging the shape of the brick, but upon the other hand this fine wire being only supported in the end of the handle was not sufficiently stiff, and was liable to bend. In order to remedy this, a different form of handle was constructed of the shape shown in Fig. 12, and this merely had a short length of wire in the form of a small loop inserted in its lower edge.

In the sketches, I have omitted several small details such as springs and balance weights, &c., in order that the illustrations should not be complicated.

I am, sir, Yours faithfully,
Haverhill, Suffolk. Augustus J. Simpson,
August 1st, 1899. Assoc. M. Inst. C.E., &c.

Malicious Damage to Machinery.—Three boys were recently charged at Manchester with having placed a piece of iron in a brickmaking machine at Sir W. G. Armstrong, Whitworth, and Company's Works, Openshaw, with intent to damage it. Mr. Crosse appeared to prosecute. He asked that the lad Scholes might be discharged and called as a witness. To this the magistrate assented. According to the evidence the machine was disabled on the 14th July and stopped for two days. The cause was discovered to be a piece of iron, but it was thought that it had got into the machine accidentally, and there was no suspicion attached to anyone. On the 27th ult. a workman found the same piece of iron in the clay and called the attention of James Harrison, the engine driver, to it. They questioned the lads, who denied all knowledge of the piece of metal. During the breakfast hour, however, they confessed, and incriminated one named Grindrod, who was alleged to have thrown the metal in the machine on the first occasion. When charged with the offence on the 27th ult., Newton admitted telling Potter to put the metal in the machine. Potter said, "I am only a new hand, and Newton has been on to me for a week to do it, so that we could have a rest"; whilst Scholes said, "I only know that Potter put it in." Mr. Reid informed the magistrates that the damage done on the first occasion amounted to between £20 and £25. The prosecutors had, however, no desire to see the lads sent to gaol. The magistrates said the offence was a very serious one, and merited severe punishment. They were quite willing to fall in with the views of the prosecutors, and would fine Newton 40s. and costs or one month's imprisonment. and Potter 21s. and costs, or a month's imprisonment Each defendant must also pay £1 towards the damage

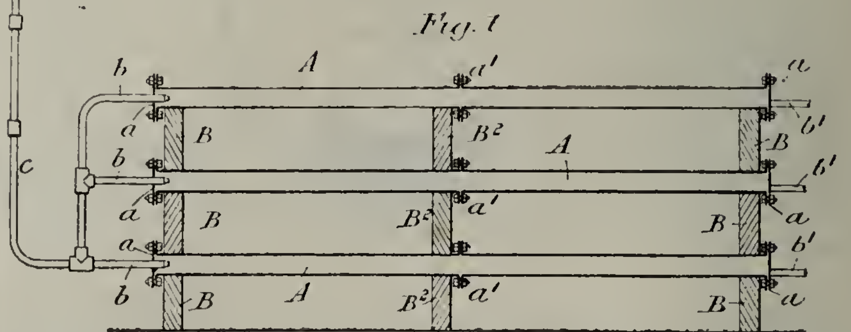
A METHOD OF DRYING BRICKS, &c.

The methods commonly in use in this country for drying bricks artificially probably originated in Staffordshire, although the Americans have recently been showing us what they can do with their very powerful systems of artificial drying. In most cases the predominent idea of these systems of artificial drying has been a heated floor upon which the green bricks are placed and either dried right off or turned as their condition improves. We must admit, therefore, that there is an element of novelty in the system which has recently been patented by Mr. Oliver Howl, of Prince's End, Tipton, Staffordshire. This is the same system which we briefly noticed in our issue of July, 1898, as being exhibited at the Royal Show, Birmingham. The leading feature of this new system is a hollow shelf or shelves fixed upon hollow uprights, and forming altogether a complete system through which hot water or steam can be caused to circulate. We dare say the system is also adapted to the circulation of hot air. It is clear that if we have a number of hollow shelves all communicating and fixed upon stationary supports which are also hollow, we have practically what amounts to a coil of pipes, with the exception that the pipes expose flat surfaces. These shelves may be arranged as closely as is convenient and there may be any number of them, thus economising space. It is obvious that if some hot water or heated air be passed through a pipe system such as Mr. Howl's shelves are, they will form an excellent arrangement on which bricks and other articles may be dried. These hollow shelves may be arranged in any number, either side by side or one above another, or both side by side and one above another. Stop cocks or valves are provided by means of which the communication between the shelves can be opened, closed or regulated. These valves also provide a means whereby any desired set of shelves may be heated, and the heating agent may, after passing through one set or tier, be conducted to another set or tier, and so on, and then back to the source of supply, or else permitted to flow away.

The rectangular character of these hollow shelves make them very convenient for drying the goods in direct contact; but for convenience of carrying, etc., the bricks or other articles may be placed on palates and then placed on the shelves.

When the shelves are arranged one above another they are connected to a vertical fixed or stationary hollow columns, provided with passages communicating with the interior of the shelves in such a manner that the steam or hot water admitted to one of the columns may be caused to pass in a circle or circuitous direction through the several shelves.

Fig. 1



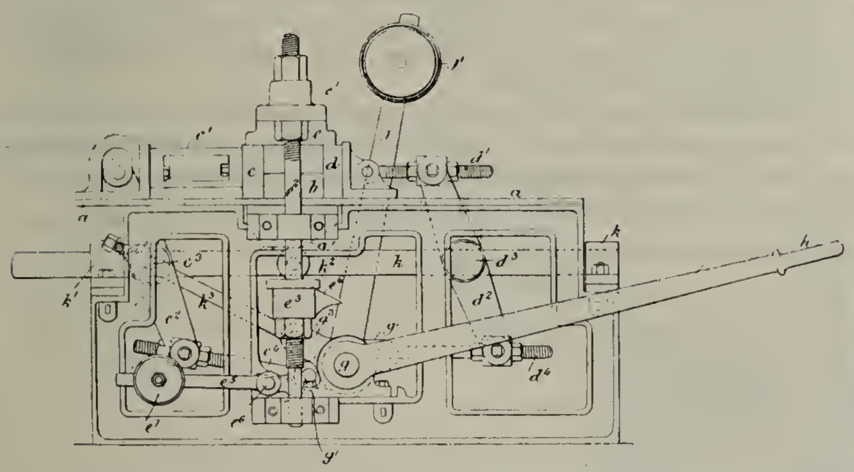
In the figure given herewith we show a section longitudinal of the simplest construction of Mr. Howl's new drying apparatus. It will be noticed that the shelves are separated one from another with blocks, which may be of wood, or which may actually be burnt bricks, or any other convenient material. There are, however, a number of different designs which Mr. Howl has covered in his patent, although his claims are very simple and shortly stated.

It occurs to us that this system is an exceedingly interesting one and likely to be very useful. We can see that it is capable of effecting great economy not only in the way the heat is applied, but in the heat medium itself. If a set of shelves, for instance, are not in use, the heat agent, whatever it may be, may be cut off from them, whilst any set of shelves may be almost immediately heated by turning the necessary taps or valves. Everyone knows the high conductivity of iron and the ease with which it radiates off any heat which it may possess. Again, we have always thought that someone would some day propose to make drying apparatus which should copy in principle the shelving of an ordinary tile house. Heated air tends to ascend, and as we have often pointed out when going through brickyards, the greater portion of the heat existing in a drying floor is practically wasted. There are, of course, objections to the use of shelves, but we believe the economical advantage of them far outweighs any minor disadvantages.

A BRICK PRESS.

It is perhaps hardly fair to call the new machine, which we are about to describe, by the simple name of "brick press," inasmuch as it is obviously adaptable to pressing other brickyard goods, and notably blocks, &c. The inventors are Mr. George Woolliscroft, of Cornhill Cross, Leek, and Mr. Henry Todd, of Stoke-on-Trent. Both these gentlemen are well-known brick and tile makers in Staffordshire, and consequently do not approach the subject from the amateur point of view, as so many of our inventors are apt to do, and as many who have bought machines made by such people know to their cost.

Fig 1



The patent is illustrated with a number of drawings, but we think, perhaps, for the purpose of this description a side elevation will show the greatest number of details, and at the same time convey the general principle.

The chief thing to notice is that the press possesses two plungers which first approach each other and then separate whilst moving in the same direction. By this means the two ends of the block of clay, or the brick, as the case may be, are pressed simultaneously, and the brick, or block, is then delivered automatically out of the mould. In the figure the press is arranged for the manufacture of coping blocks. A is a table to which is fixed the two plates, one of which is marked B as shown in the drawing, and which together form the sides of the mould. C and D are the two plungers which form the ends of the mould, whilst E and F are the top and bottom respectively. The method by which the shaft is worked is quite clear from the drawing; it has fixed to it a handle and an arm carrying a counterbalance weight.

The arrangement of the levers is extremely ingenious, and as will be seen, is also the arrangement of the surfaces which form the mould. When the block is ready to be pressed on the table A between plungers C and D, the handle H (which to begin with is in a vertical position) is pulled down into the position shown in the figure, and this brings the different parts of the mould together, the two plungers approaching each other, and then separating, and finally on raising the handle the mould opens up and the block is pushed out endwise.

As a hand press we should think this arrangement possesses a good many advantages. The system of levers appears to be very ingeniously arranged so as to obtain the maximum amount of power out of the downward pull, and any losses are compensated for. We have no data as to the amount of pressure which is brought to bear upon the bricks, but we understand that the press turns out a very excellent article.

LEADLESS GLAZE.

An important regulation has been issued by the Office of Works. It is to the effect that all articles for domestic use supplied under contract for the Public Department, the Houses of Parliament, and such of the Royal Palaces as are under their charge, shall be made with leadless glaze. Earthenware, stoneware, and glazed bricks used for sanitary or architectural purposes, have to obtained as required by the surveyors of the department. It has been found impossible at the present time to insure an adequate supply of these articles made with leadless glaze; but the Office of Works are making enquiries with a view to arrangements which will effect this object.

Fatal Accident to a Clayworker.—From Wellingborough comes the sad news of a fatal accident to an old and respected clayworker, Captain Henry Buck, one of the managers of the Irthlingborough Brick and Tile Company's Works.—This calamity happened on Saturday, July 29th, as Captain Buck was driving home alone from Wellingborough. There does not appear any direct evidence of how the accident occurred, but apparently the horse fell and pitched Captain Buck out of the trap. He was discovered by a boy about one o'clock, lying on the ground apparently lifeless.—Captain Buck succumbed to the effects of his injuries on the day ~~following the accident~~. Deceased was a well-known figure in the district, and one of the first to take up and open out the valuable mineral deposits in the little rural parish and district of Irthlingborough, and widespread regret is felt at his painfully sudden and untimely end.

Sales of Brickyards.—On the 15th inst. Messrs. G. B. Hilliard will offer by auction a property at Billericay, Essex, and on the 26th inst. Messrs. A. M. Robinson & Son will dispose of "Poplar Hall," in Cambridgeshire. For further particulars see Miscellaneous Advertisement columns.

A CONTINUOUS KILN FOR BLUE BRICKS.

A continuous kiln in which it is possible not only to burn ordinary kinds of brick-yard goods but also blue bricks and glazed sanitary tubes, etc., is certainly an innovation. The loss of heat which now goes on in most kilns which are designed for burning goods at high temperatures, has always appeared to us to be a very serious matter, but in a continuous kiln it is obvious that this heat can be utilised, and down to the utmost caloric. Such a kiln as this has been invented by Messrs. Peter Wood, Ltd., of West Bromwich, in conjunction with Mr. H. P. Nash, of Oldbury, and we think they are to be congratulated upon having made a distinct advance in the method of burning bricks. We understand that the kiln has not only been thoroughly tested in its experimental stages, but that it is in successful operation at the Pumphouse Blue Brick Works, West Bromwich, where may be seen a continuous kiln on the new principle with a drying shed yielding an output of 200,000 blue bricks per week. The single chimney stack is stated to give off only a mere trace of vapour, all the combustible matter commonly poured out in other kilns with the smoke having been completely consumed.

We should like to give a detailed account of this new kiln illustrated with diagrams, but space will scarcely permit of that, and we must content ourselves with a description of the leading features without illustrations, inasmuch as we must either give all the illustrations or none at all.

In the first place the new kiln is, of course, a combination kiln, chambers being built in a continuous series, end to end, with partition walls between any two adjacent kilns, and with the flues so arranged that any one or more of the kilns of the series can be cut out from use when required. Further, the heat can be directed at will from any one or more of the kilns to others as the circumstances and the conditions may require.

The new principle is particularly applicable to those kilns which are arranged to work with a down draught—*i.e.*, with the heat working down from the upper part of the kiln through the goods and through an open bottom central flue, which runs along the centre and is common to all down-draught kilns. This flue is in connection with the chimney stack. The new kiln, however, can be arranged to work with an up draught if this is preferred.

There are no flues or passages in the partition walls between the adjacent kilns in the series and consequently these walls need not be several feet thick as they usually are in continuous kilns, but may only be one brick thick.

The usual fire-holes are placed in the sides and there are the usual wickets through which the chambers may be set or drawn. Along the centre of the series of kilns is the usual central open-topped bottom flue which, when the kilns are all working with a down draught, naturally receives the heat ; the "pull" being supplied by the chimney shaft. This bottom flue is stopped off between each chamber. Leading from the sides of the bottom flue there are covered branch flues controlled by dampers, and at one side communicating with a main flue which leads to the stack. These branch flues communicate by vertical passages in the side walls of the kilns with two main top heat flues arranged in the walls near the hip of the arch, and extend along the series from end to end. Small cross flues open out into the arch from the sides. All these passages are controlled by dampers and the method of working them need not be particularly described, as it will be easily understood by those who are accustomed to working continuous kilns.

BREAKDOWNS IN MACHINERY.

Breakdowns in brick-making machines are usually the result of either one or two simple reasons : iron, in the shape of bolts, nuts, or hammer-heads—the latter usually when the playful young British clayworker wants a holiday—getting into the machine, or when there has been bad fitting or adjustment of the parts.

It has been so frequently my lot to stand by and see gear-wheels, cast-iron side frames and such-like broken, varying from £5 in value to £30, that anything old or new in the way of friction or brake-driving, springs, clutches, etc., etc., always commands a great deal of my attention and respect.

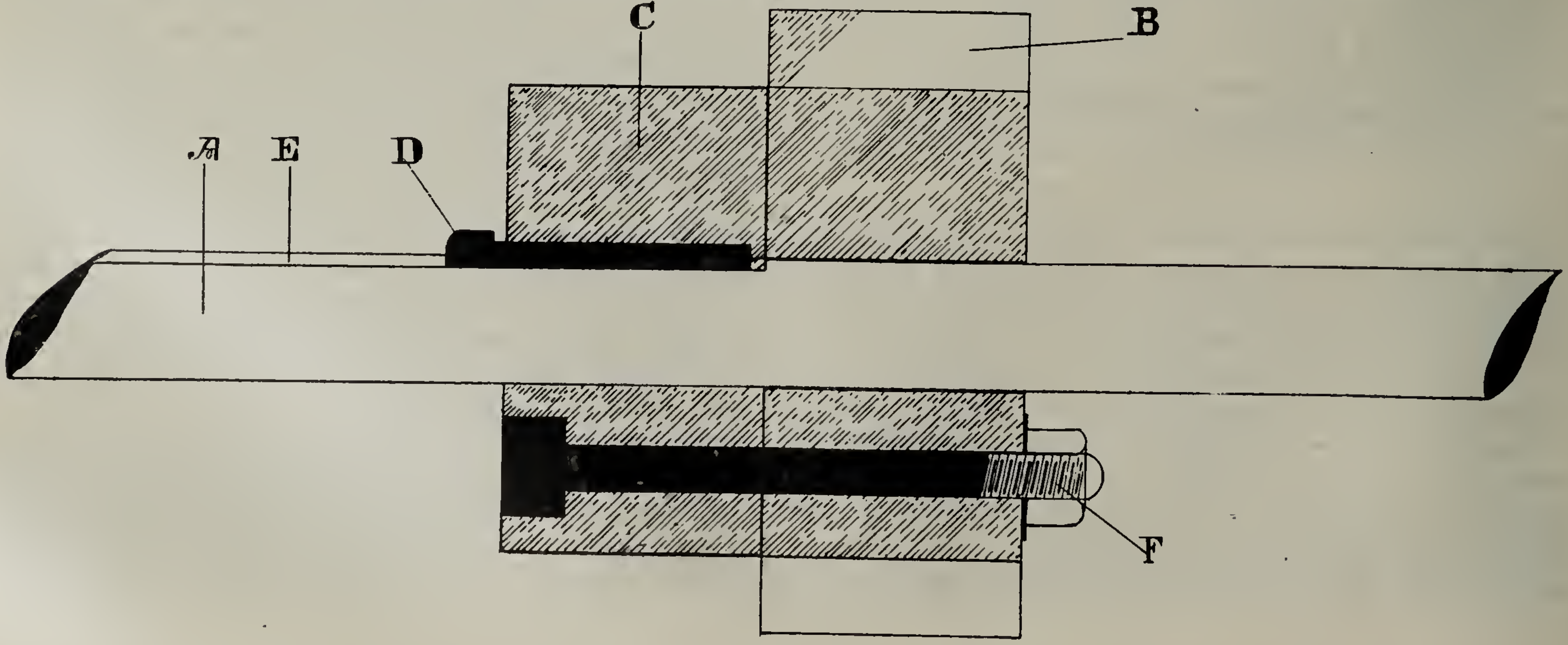
I am illustrating now, I think, something fresh, that should in many instances save serious mishap.

My drawing shows the section of an arrangement for attaching a driving-wheel or pinion—spur, helical, belt, etc.—to a turned shaft, not with the usual immovable key-groove and key, but by simply having the driver bored true to shaft, and attached to a fixed coupling block with a $\frac{7}{8}$ or 1 inch bolt or bolts, according to the nature of the work to be done.

Thus, for instance, in the event of the hammer-head episode, the bolt breaks, and the shaft runs free within the wheel, until the engine can be stopped.

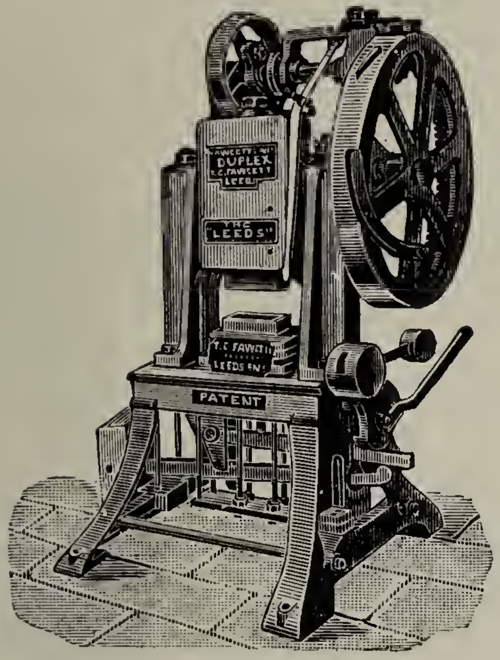
It is simple, easy of access, instantly connected and restarted.

In my sectional sketch, A is the shafting, B a pinion driving wheel, C the fixed coupling block, D the attaching key to shaft, E key to groove, and F is the connecting bolt.—G. T. D.



THE "LEEDS" BRICK PRESS

With Fawcett's Patent Stopping and Dead-weight Thicknessing Motion and Differential Pressure.



This Press is very largely used for pressing glazed bricks, which require to be all of exact equal thickness. It will press about 4,000 bricks per day with one boy to operate it, and will press them all of one exact equal thickness, although the quantity of clay may vary half-a-pound; this is done by the patent compensation arrangement of bottom moveable panel with levers and weights.

It is also suitable for pressing all kinds of plain and ornamental, red and glazed bricks, tiles, and terra-cotta work.

It is also fitted with my patent differential purchase gearing, for giving double purchase while pressing the brick, which is a very necessary and advantageous feature over other Presses.

The Machine is substantially built, and of the best materials; all bearings are bushed with best gun metal, and of extra large sizes. The pressure is obtained by our well-known patent toggle-motion levers, which are all of the best crucible steel; all the working parts can be seen while the machine is at work, and are easy of access for oiling, etc. It is very easily and quickly adjusted for different thicknesses of bricks. It is also fitted with automatic gear for stopping the pressing head at the top, after pressing the brick, and automatically lifting it out of the mould ready for taking away by hand instead of by the usual pushing arm; another brick is then put on, and by moving a small handle close to the operator, the machine starts and completes another cycle of operations.

THOS. C. FAWCETT, Ltd.,
Whitehouse Engineering Works, Hunslet Road, LEEDS.

Makers of Patent Semi-Dry and Plastic Machines, Steam and Hand Presses, Pug Mills, Solid and Perforated Bottom, Clay Grinding Pans, Clay Crushing Rollers, Clay Mixers, Sieves, Engines, Shafting, and

GENERAL BRICK & CEMENT MAKING PLANT.

ILLUSTRATED CATALOGUES ON APPLICATION.

A PAVING BRICK TESTING MACHINE.

A new impact testing machine for testing paving brick has been designed by Mr. G. Jones, of Geneva, N.Y., in which the bricks are held securely clamped around the inner periphery of the barrel. The barrel holds thirty-two bricks, which have one face exposed to the abrading material, which consists of 150 lb. of steel-chilled iron cubes. The chief merits of this machine are said to be (1) that it stimulates actual conditions of service better than the methods heretofore used; (2) that it will probably give more uniform and more easily standardised results; and (3) that specimens of different manufacture may be readily tested at a single operation with results that are truly comparative.

IMPROVED PRESS CLOTHS.

Mr. C. T. Hill and Mr. F. W. Williams, of Liverpool, have devised an improvement in potters' press cloths for use in the preparation or treatment of pottery clay. In cloths having a nozzle through which the water expressed from the clay finds an exit, the nozzle hole is provided on one or both sides with a resilient flange or washer of rubber or canvas, or other suitable material, of somewhat larger diameter than the metallic flange and washer of the nozzle, to prevent the press cloth from being torn or cut through by the nozzle.

A NEW CHINA CLAY KILN.

This is a modification of the usual form of china clay kiln, designed to secure a better distribution of heat, with the object of effecting economy in the drying of the clay and preventing overburning. A combustion chamber is interposed between the furnace and the kiln, being separated from the former by a fire bridge, and connected with the main culvert by flues. The flues have each independent openings into the main culvert so as to avoid the interaction of one upon another. As one might expect, this new kiln hails from Cornwall, and has been devised by Mr. G. M. Henley, of Roche.

A NEW REFRACTORY MATERIAL.

A material possessing great fire-resisting properties is the invention of Mr. J. Grange, of Newcastle, who states that it can be made of a compound consisting of 1 cwt. of powdered blast furnace slag, 1½ gallons of gas tar, 12lb. of salt and 2 or 3 lb. of starch, the materials being made into a paste with water. He claims that this material can be used for refractory bricks, blocks, and slabs, pipes, and other coverings, furnace and like linings, retorts, seggars, melting pots, road pavements, and the like, and in compositions for forming the same, and for other uses as a substitute for mortar and cements. Truly this material seems to have universal application.

(All Rights Reserved.)

BOOK-KEEPING FOR BRICKMAKERS.—VII.

APPENDIX.

BRICKMAKERS' ACCOUNTS.—FORMS.—*(Continued.)*

No 5.—THE EASTVILLE BRICK COMPANY.—PURCHASES LEDGER.

H. Carrier, London.

3

1896				£	s.	d.	1896				£	s.	d.
Oct.	31	To Cash	8	25	0	0	Sep.	30	By Carting	9	25	0	0
Nov.	30	do.	9	30	0	0	Oct.	31	do.	10	30	0	0
Dec.	31	do.	10	20	0	0	Nov.	30	do.	11	20	0	0
		To Balance		32	0	0	Dec.	31	do.	12	32	0	0
				£107	0	0					£107	0	0
							Dec.	31	By Balance		£32	0	0

Wood Bros., Timber Merchants, Eastville.

5

1896				£	s.	d.	1896				£	s.	d.
Oct.	31	To Cash	8	15	0	0	Sep.	30	By Goods	9	15	0	0
Nov.	30	do.	9	15	0	0	Oct.	31	do.	10	15	0	0
				£30	0	0					£30	0	0

Bishop & Co., Oil, &c., Merchants, Newcastle.

7

1896				£	s.	d.	1896				£	s.	d
Oct.	31	To Cash	8	5	0	0	Sep.	30	By Goods	9	5	0	0
Nov.	30	do.	9	3	15	0	Oct.	31	do.	10	3	15	0
Dec.	31	To Balance		4	0	0	Dec.	31	do.	12	4	0	0
				£12	15	0					£12	15	0
							Dec.	31	By Balance		£4	0	0

Binder Bros., Machine Builders, Sheffield.

9

1896				£	s.	d.	1896				£	s.	d.
Oct.	31	To Cash	8	300	0	0	Sep.	30	By Goods	9	300	0	0
Nov.	30	do.	9	18	10	0	Oct.	31	do.	10	18	10	0
Dec.	31	To Balance		20	0	0	Dec.	31	do.		20	0	0
				£338	10	0					£338	10	0
							Dec.	31	By Balance		£20	0	0

Fowler & Co., Oil, &c., Merchants, London.

11

1896				£	s.	d.	1896				£	s.	d.
Oct.	31	To Cash	8	5	0	0	Sept.	30	By Goods	9	5	0	0
Nov.	30	do.	9	6	0	0	Oct.	31	do.	10	6	0	0
Dec.	31	do.	10	4	0	0	Nov.	30	do.	11	4	0	0
		To Balance		6	0	0	Dec.	31	do.	12	6	0	0
				£21	0	0					£21	0	0
							Dec.	31	By Balance		£6	0	0

Imperial Insurance Company, London.

13

1896				£	s.	d.	1896				£	s.	d.
Oct.	30	To Cash	8	10	0	0	Oct.	31	By Premium	10	10	0	0

Roller & Sons, Stationers, London.

15

1896				£	s.	d.	1896				£	s.	d.
Nov.	30	To Cash	9	20	0	0	Oct.	31	By Goods	10	20	0	0

Smokeless Coal Company, Derby.

17

1896				£ s. d.	1896				£ s. d.
Oct.	31	To Cash	8	20 0 0	Sept.	30	By Goods	9	20 0 0
Nov.	30	do.	9	35 0 0	Oct.	31	do.	10	35 0 0
Dec.	31	do.	10	25 0 0	Nov.	30	do.	11	25 0 0
		To Balance		30 0 0	Dec.	31	do.	12	30 0 0
				£110 0 0					£110 0 0
					Dec.	31	By Balance		£30 0 0

Bridge Colliery Co., Chesterfield.

19

1896				£ s. d.	1896				£ s. d.
Oct.	31	To Cash	8	25 0 0	Sept.	30	By Goods	9	25 0 0
Nov.	30	do.	9	24 0 0	Oct.	31	do.	10	24 0 0
Dec.	31	do.	10	35 0 0	Nov.	30	do.	11	35 0 0
		To Balance		20 0 0	Dec.	31	do.	12	20 0 0
				£104 0 0					£104 0 0
					Dec.	31	By Balance		20 0 0

J. & C. Marks, Coal Merchants, Eastville.

21

1896				£ s. d.	1896				£ s. d.
Oct.	31	To Cash	8	10 0 0	Sept.	30	By Goods	9	10 0 0
Nov.	30	do.	9	16 0 0	Oct.	31	do.	10	16 0 0
Dec.	31	To Balance		15 0 0	Dec.	31	do.	12	15 0 0
				£41 0 0					£41 0 0
					Dec.	31	By Balance		15 0 0

North Junction Railway (Coal), London.

23

1896				£ s. d.	1896				£ s. d.
Oct.	31	To Cash	8	40 0 0	Sept.	30	By Carriage	9	40 0 0
Nov.	30	do.	9	50 0 0	Oct.	31	do.	10	50 0 0
Dec.	31	do.	10	57 0 0	Nov.	30	do.	11	57 0 0
		To Balance		48 0 0	Dec.	31	do.	12	48 0 0
				£195 0 0					£195 0 0
					Dec.	31	By Balance		48 0 0

North Junction Railway (Bricks), London.

25

1896				£ s. d.	1896				£ s. d.
Oct.	31	To Cash	8	320 0 0	Sept.	30	By Carriage	9	320 0 0
Nov.	30	do.	9	380 0 0	Oct.	31	do.	10	380 0 0
Dec.	31	do.	10	300 0 0	Nov.	30	do.	11	300 0 0
		To Balance		350 0 0	Dec.	31	do.	12	350 0 0
				£1,350 0 0					£1,350 0 0
					Dec.	31	By Balance		350 0 0

Overseers of Parish of Eastville (Poor Rate).

27

1896				£ s. d.	1896				£ s. d.
Nov.	30	To Cash	9	40 0 0	Nov.	30	By Rate	11	40 0 0

Active & Co., Agents, London.

29

1896				£ s. d.	1896				£ s. d.
Dec.	31	To Cash	10	48 0 0	Sept.	30	By Commission	9	15 0 0
		To Balance		21 0 0	Oct.	31	do.	10	20 0 0
					Nov.	30	do.	11	13 0 0
					Dec.	31	do.	12	21 0 0
				£69 0 0					£69 0 0
					Dec.	31	By Balance		21 0 0

No. 6.—THE EASTVILLE BRICK CO.—IMPERSONAL LEDGER.

Wages (Capital).

1

1896		C.B.	£	s.	d.	1896		J.	£	s.	d.
Sept. 3	To Cash	8	3	0	0	Dec. 31	By Transfers, as under—				
Sept. 10	do.	8	4	0	0		,, Kiln B	1	40	0	0
Sept. 17	do.	8	3	0	0		,, Machinery	1	17	0	0
Sept. 24	do.	8	5	0	0						
Oct. 1	do.	8	3	0	0						
Oct. 8	do.	8	2	0	0						
Oct. 15	do.	8	9	0	0						
Oct. 22	do.	8	3	0	0						
Oct. 29	do.	8	2	0	0						
Nov. 5	do.	9	2	0	0						
Nov. 12	do.	9	4	0	0						
Nov. 19	do.	9	5	0	0						
Nov. 26	do.	9	3	0	0						
Dec. 6	do.	10	3	0	0						
Dec. 13	do.	10	1	0	0						
Dec. 20	do.	10	2	0	0						
Dec. 27	do.	10	3	0	0						
			£57	0	0				£57	0	0

Manufacturing Materials.

2

1896		J.B.	£	s.	d.	1896		J.	£	s.	d.
Sept. 30	To Sundries	9	10	0	0	Dec. 31	By Stock		10	0	0
Oct. 31	do.	10	9	15	0		,, Profit and Loss	2	23	15	0
Nov. 30	do.	11	4	0	0						
Dec. 31	do.	12	10	0	0						
			£33	15	0				£33	15	0
Dec. 31	To Stock		10	0	0						

Repairs and Renewals.

3

1896		J.B.	£	s.	d.	1896		J.	£	s.	d.
Oct. 31	To Sundries	10	18	10	0	Dec. 31	By Stock		15	0	0
Dec. 31	do.	12	20	0	0		,, Profit and Loss	2	23	10	0
			£38	10	0				£38	10	0
Dec. 31	To Stock		15	0	0						

Coal.

4

1896		J.B.	£	s.	d.	1896		J.	£	s.	d.
Sept. 30	To Sundries	9	95	0	0	Dec. 31	By Stock		50	0	0
Oct. 31	do.	10	125	0	0		,, Profit and Loss	2	400	0	0
Nov. 30	do.	11	117	0	0						
Dec. 31	do.	12	113	0	0						
			£450	0	0				£450	0	0
Dec. 31	To Stock		50	0	0						

Wages (Revenue).

5

1896		£	£		£	s.	d.	1896		J.	£	s.	d.
Sept. 3	To	200,000		8	77	0	0	Dec. 31	By Sundry Expenses	1	20	0	0
Sept. 10	,,	215,000		8	81	0	0		(Transfer from Wages as per Wages Summary)				
Sept. 17	,,	225,000		8	83	0	0		,, Profit and Loss	2	1,363	0	0
Sept. 24	,,	200,000		8	77	0	0						
			840,000										
Oct. 1	To	180,000		8	70	0	0						
Oct. 8	,,	200,000		8	77	0	0						
Oct. 15	,,	180,000		8	71	0	0						
Oct. 22	,,	210,000		8	79	0	0						
Oct. 29	,,	220,000		8	83	0	0						
			990,000										
Nov. 5	To	190,000		9	80	0	0						
Nov. 12	,,	200.000		9	79	0	0						
Nov. 19	,,	180,000		9	70	0	0						
Nov. 26	,,	220,000		9	86	0	0						
			790,000										
Dec. 6	To	212,000		10	81	0	0						
Dec. 13	,,	220,000		10	85	0	0						
Dec. 20	,,	200,000		10	79	0	0						
Dec. 27	,,	220,000		10	85	0	0						
			852,000										
	Reserve to 31st		110,000		40	0	0						
			£3,582,200		£1,383	0	0				£1,383	0	0
								Dec. 31	By Reserve		40	0	0

INSTITUTE OF CLAYWORKERS.

A Committee Meeting was held at 43, Essex Street, Strand, on the 14th July, 1899.

There were present:—Messrs. Edgar Webster (President), H. Greville Montgomery, S. Geo. Collier, S. Smith-Harvey Wm. Cunliffe, Chas. Cunnell, Arnold Statham.

The following officers were elected:—Clement B. Broad (Messrs. Broad and Co., Limited, London), Chairman of Committee; H. Greville Montgomery, Hon. Sec. and Treasurer; Wm. Pilkington, Secretary.

The following New Members were elected:—

Barttelot, Sir Walter, Bart., Pulborough.
Batley, S. R. S., Chandler's Ford.
Colthurst, Symons & Co., Ltd., Bridgwater.
Dixon, C. Bagshawe, Ipswich.
Eaton, Wilford H. H., Longsdon, Staffs.
Freakley, John & Co., Ltd., Dudley Port, Staffs.
Fuller, Alfred, J.P., Ramsey, Huntingdon.
Gregory, Alfred, Belvedere.
Harrison, J. M., Lincoln.
Holloway, Thomas, Victoria Works, Battersea, S.W.
Hunter, Sydney G. W. (Thomas Middleton and Co.), Southwark.
Kemp, George, Aldershot.
Lindley, Walter (Whitwick Colliery Co., Ltd.), Coalville.
Lissimore, Thomas, Irthlingborough.
Lucas, J. W., Bournemouth.
Pullan & Mann, Elland Road, Leeds.
Riches, George, J.P., Cromer.
Robson, Thomas Pearson, Broad Street House, E.C.

"PENCE" MONEY.

A letter was read from a member of the Institute stating that a prosecution was about to be instituted against him for refusing to pay "pence" money claimed to be due by a worker in his employ. This "pence" money is a sum which is paid to the workman only on condition that he remains at his post until the end of the season, and it is an established custom of the trade that the money is forfeited should the employé seek work elsewhere. Although cases in the courts had hitherto gone in favour of the masters, one had recently been decided in favour of the men, and it was for this reason that the point was raised as to whether the Institute would, if necessary, carry the case to the Court of Appeal to be definitely settled.

Mr. Arnold Statham, standing counsel to the Institute, who was present at the meeting, gave his opinion, and it was decided that, under certain circumstances, the Institute would conduct an appeal case.

QUERIES AND REPLIES

Boiler Water from Pit.—*Can any of your readers help me? Last winter I deepened my reserve water pits about 6 feet, in red marl. I have not had occasion to use any of the water until recently, and I find it has not settled at all, but is red and thick just as if it was stirred up every day. As I now want water for my boiler, can I cure this?*—M. C. J.

Cracks in Drying.—*We are troubled with the faces of our bricks cracking during drying. The bricks are wire-cuts, and dried in both steam and hot-air sheds. The process of cracking is as follows:—After the bricks have been on the floors about three hours, fine cracks make their appearance, mostly on the side which is greased with oil. These gradually become bigger, sometimes a crack running from end to end of the brick ¼-inch deep. And after the brick is burnt the crack is very much widened. The bricks are made through a double-shafted mill and expressing rollers. The clay is ground fairly fine. Hoping that you will be able to help me through your valuable journal.*—E. F.

This is an old story. The reason is probably to be found in the toughness of your clay. It is probably not sufficiently porous to let the moisture out easily when the bricks are exposed to a quick-drying temperature in your hot-air sheds or your steam floors. Several courses of treatment are open, and we cannot in the absence of a sample of your clay say with any confidence which is the best to adopt in your particular case. You may dry at a much slower heat, then the water will evaporate from the surfaces more slowly, and that which is within the brick will not make a way for itself by tearing open cracks. [We are trying to use plain terms in order to describe what is really an interesting scientific phenomenon.] Again, you may check draught and dry in a close heat. A better plan may be to find some harsh clay which when mixed with fine, strong clay will correct its toughness and plasticity. Sand or burnt ballast or burnt crocks—all, of course, well ground—might prevent the difficulty. You must ascertain the right amount by various experiments.

E. W. P., Majolica Glazes.—It seems from your letter that you are using the glaze raw. It must be fritted first, then ground down, and prepared for use. The stains should be fused with the fritt generally to get the best results. It would be best to forward a few pieces shewing the various results, which would enable us to assist you. For tile dips see back numbers of the *B.C.W.*, or use one of the advertised stains.

Sink.—The Armley Size Works, Armley, Leeds, or any local glue and size manufacturer will supply what you require—jelly or concentrated. If you experience trouble in getting the paper through a newsagent, you can obtain it direct from the office on the 15th of each month.

Stock Brick-making.—Some particulars concerning this were given in our issues of October and December, 1898. As to your queries *re* quantities, &c., the proportion to mix of common ashes is about 3½in. to the foot, coke ashes would be about 2in. For starting the kiln, all that is necessary is a small quantity of common breeze, which is lighted in a fire hole constructed in the building of the clamp. The time of burning, of course, depends on the size of the kiln. About a neck a day is a fair average time. As to its turning out a good brick of its kind there is no question. But why not take a turn round one or two stock yards? You could learn more in a day than you could be taught on paper in three months.

Railway Charges for Carriage of Bricks.—The computed weight is generally in favour of the brickmaker, and the railway company would probably prefer to charge you *actual* weight. But in most cases this is clearly against the brickmaker, for weighbridges are more often than not defective and clerks are not immaculate, while certain bricks that have been subjected to wet will weigh heavier than those taken direct from the kiln. And there is a further advantage in being able to quote customers a charge for delivery beforehand. The Great Eastern Railway, through the instrumentality of the Institute of Clayworkers, gave its customers a computed weight from kiln, and added 1 cwt. per thousand for differences. This arrangement has so far worked very satisfactorily.

THE WORKMEN'S COMPENSATION ACT, 1897.

OBJECT LESSONS TO THE TRADE.

FALL INTO A PIT.

On July 14th, H. Goodwin, employed in No. 3 Yard of the London Brick Company at Peterborough, was barring down clay, when he lost his balance and fell backwards to the bottom of a pit 22ft. deep. He was conveyed to the Peterborough Infirmary to be treated.

SERIOUS INJURY TO HAND.

On July 12th, H. Kefford, employed by Mr. E. Plowman, of Stanpit, Shefford, was greasing the cog-wheels of the machinery with a stick, this broke, and drew his hand into the wheels, crushing it so badly that it was found necessary to amputate it half-way from the wrist to the elbow.

DEATH THROUGH THE TIGHTENING OF A WIRE ROPE.

A brickyard labourer named Franklin met with a frightful death at Messrs. Hicks Gardner's brickyard, Peterboro'. He was at work near a rope which was lying slack on the ground, when it was suddenly pulled tight, catching the unfortunate man under the chin and jerking him off his feet. He was picked up in an unconscious condition by some of his fellow-workmen, who started with him for the Peterborough Infirmary, but he passed away before that institution was reached. The deceased leaves a wife and five children.

ACCRINGTON ENGINEER'S DEATH.

A shocking accident occurred at the works of the Whinney Hill Plastic Brick Company, Accrington, on June 17th, afternoon. A labourer going into the boiler-house found the engine-tenter, Henry Shutt, of Sonth Street, Huncoat, lying in front of the boiler dead, with fearful scalds over the upper part of his body. Shutt, it is assumed, was repairing the economiser when a sudden and unexpected stream of steam played upon him from the boiler, and his injuries were such that he must have died in two or three minutes.

THE VALUE OF AN EYE.

An interesting decision under the Workmen's Compensation Act has recently been given. The plaintiff was a labourer named John Geary, of 7, Calder Close, Coatsbridge, and in February he sued Dixon, Limited, coal and iron masters, of Glasgow, for compensation for the loss of his right eye while in their employment as an assistant furnaceman. The claim raised by him was for the difference between the amount of his average weekly earnings before the accident (30s. 8d.) and the average amount he was able to earn after it (21s. 6d.). His Lordship awarded the amount of his claim in a judgment on 14th February last. The defendants contended that the statute provided that only half of the difference in the earnings should have been awarded, and they took a stated case to the Court of Appeal, which, however, upheld the Sheriff's decision. Last week the defendants were allowed a proof as to the alleged discontinuance of the plaintiff's partial incapacity, in respect of which he had been granted the allowance of 9s. 2d. per week; and, following that proof, his Lordship issued a judgment in which he found that the plaintiff was no longer incapacitated from pursuing the occupation which he was following at the time of the accident, and therefore ends and determines the weekly allowance of 9s. 2d. No expenses were awarded. In a note his Lordship quoted the evidence of four witnesses who had lost the sight of an eye while working as assistant furnace-keepers, and all of whom said this in no way affected their efficiency to perform the duties of their calling. In face of such evidence, now that the inflammation in plaintiff's eye had disappeared, and that it was simply a dead eye, it could no longer be held that he was incapacitated from pursuing his former avocation, which, according to the evidence was offered him. All that the Act provided for was a weekly allowance during partial or total incapacity.

A SCOTCH CASE.

In the First Division of the Court of Session for Scotland, a case in an arbitration under the Employers' Liability Act, in which William Dollan, labourer, 106, Clippens Row, Johnstone, claimed compensation from his employers, the Linwood Brickmaking Company, Limited, 5, Oswald Street, Glasgow, for injury to his left hand, caused by the stamper of a stamping machine, in the respondents' brickworks, coming down upon it, was brought before the Lord President, and Lords Kinnear and McLaren. The case was stated by Sheriff-Substitute Spens, who found in fact that the appellant was engaged to work on the night shift, and obtained employment on the false representation that he was over eighteen years of age, whereas he was only sixteen. His particular work was to run a bogey loaded with bricks from the stamping machine to the kiln, and he and two other lads by arrangement known to the respondents' foreman interchanged duties. On 23rd February, the appellant took the place of another lad, M'Mahon (who was then cleaning the machine), and engaged taking bricks from the plate, and thinking that the stamper was dirty, put his left hand into the machine to clean the stamper, with the result that it came down upon his hand. It was absolutely against the rules of the work to clean the stamper until the machine was stopped, and then only by a special tool provided for the purpose called a scraper. On these facts the Sheriff-Substitute held that the accident did not arise out of and in the course of the employment of the appellant, and that the accident was attributable to the serious and wilful misconduct of the appellant, in respect he would not have been employed on the night-shift had it not been for his fraudulent misrepresentation as to his age; compensation was accordingly refused. The questions in law for the opinion of the court were: (1) Whether the accident to the appellant arose out of his employment with the respondents; and (2) whether the accident was attributable to the serious and wilful misconduct of the appellant. The Court now answered the first question in the negative; and found the respondents entitled to expenses. The Sheriff-Substitute's decision on the second question was not supported by the respondent's. The Lord President said the Sheriff-Substitute was right. He did not think that in every case it was a question of law whether the accident arose out of and in the course of the employment of the appellant, but they must, at all events, determine the case on the facts which the Sheriff had found. The first question was whether, assuming there was a recognised interchange between the appellant and M'Mahon of their respective duties, this occurred in the course of what was originally M'Mahon's employment. That was a question of fact which the Sheriff had decided, and when they examined the facts it did not appear as an express finding or as matter of legal or even of natural inference that it was part of M'Mahon's duties to clean that machine at all; and as the original employment of the appellant was something totally different, it fell to him to make out that his change of work had the sanction of his employers. He was for answering the first question in the negative. The finding of the Sheriff on the second question was not maintainable, and was not supported. Their lordships concurred.

DEATH UNDER CHLOROFORM.

An inquest was opened at the Leicester Infirmary on the body of Alfred Wiggett, aged 54, a labourer, of Littleworth. It appeared that the deceased was in the employ of the Albion Clay Company at Woodville, and last February met with an accident while greasing the axles of the wheel of the clay-box, which caused serious injury to the elbow. He was admitted to Leicester Infirmary to undergo an operation. The House Surgeon said the arm had become fixed in a useless position, and it was proposed to exercise the elbow joint. Deceased was placed under chloroform. While witness was engaged with the preparations for the operation the patient had suddenly ceased breathing. All means were used to restore respiration, but without success, death being due to asphyxia, consequent on the administration of chloroform.

A BUILDING THIRTY FEET IN HEIGHT.

An important judgment has been given in the Leicester County Court, by his Honour Judge Wightman-Wood, who has construed and defined until it shall be otherwise construed and defined, the precise limit and conditions to be understood by the term "a building 30ft. in height," a term which has long been a much-vexed question in the administration of the Workmen's Compensation Act. As is well known, a "building 30ft. in height" is included along with factories and other places as one of the conditions under which the benefits of the Act may be obtained.

The case tried before the Leicester County Court judge was the claim of a labourer who had fallen less than 30ft. into the area of a building, which was, in another part, over 30ft. high, *measured from the area*, but less than the prescribed height measured from the ground or street pavement level. In giving his decision, the judge construed this ambiguity of the Act as follows: That the height of a building should for the purposes of the Act be measured from the point when the walls can first be seen above ground in a general view. The height of a building, therefore, having open areas may be computed from the pavement line of those areas. Any other construction of the Act the judge pointed out would lead to such an anomalous absurdity as that it should be necessary to say that a man fell 33ft. from a building 27ft. high. The judge also decided that the whole of a building, any part of which was 30ft. high, might be considered to be such a building as entitled a workman injured thereon to the benefits offered by the Workmen's Compensation Act.

THE COST OF A SLIP.

This was an action under the Employers' Liability Act. Mr. W. B. Smith for plaintiff, and Mr. Tinsley Lindley for the defendant. Mr. Smith said the applicant was Jos. Burton, a youth, who sued through his next friend, Henry Burton, for compensation from Thomas Smart, brickmaker and contractor, Nottingham, for injuries sustained whilst in the latter's employment. The applicant was employed by defendant as what was known as a "taker-off" at a brick-making machine, and in consequence of the slippery state of the ground, owing to the oil from the machine falling on the grass, he slipped, and his hand becoming entangled in the machine, one of the fingers of the left hand was taken off to the second joint. Mr. Lindley, interposing, said the liability was admitted; it was only a question of amount. Mr. Smith then explained that there was a dispute as to the date upon which the occurrence took place, as to whether it was the 8th March, or the 15th March. The applicant was in the employment of defendant for about six months, and during that period he was earning about 15s. per week, and it was asked that the award should be based upon that, and paid to the young man up to the date of this application. So far as the applicant was concerned, he was incapacitated from doing the same kind of work which he was doing before. Joseph Burton, the applicant, deposed that he was 17 years of age. When he was employed by Mr. Smart he received 14s. 11d. wages per week when he made a full week. He described the accident, which he said occurred on the 8th March. Replying to Mr. Lindley, witness said he had since worked for the Wilford Brick Company, but he was not put to the same kind of work that he did previously. He did not go back to Mr. Smart when an offer was made to him to do so, because as he had lost one finger he thought that was enough. It was in the first week of April that he went with his father to see Mr. Smart, who said he was willing to take him back to work. His Honour, in giving judgment, said that he would allow the plaintiff 6s. 7d. per week for four weeks from March 27th, 3s. per week from that date until the 3rd of July, and from that date 1d. per week permanently by way of acknowledgment until the order of the judge should be ended, diminished, increased, or redeemed in accordance with the provisions of the Act.

WHAT IS AN ACCIDENT?

A JUDGE CONSULTS THE DICTIONARY.

At Bow County Court before his Honour Judge French, Q.C., an application under the Workmen's Compensation Act was heard. The applicant was Benjamin Walker, engine fitter, 367, Queen's Road, Upton Park, and the respondents were Lilleshall & Company, engineers, Oaken Gates, Shropshire. Applicant said that on April 17th he was working at the West Ham electric light and pumping station at Abbey Mills for the respondents, who had a contract there. He was assisting in making some red lead joints in some steam piping. He had some blisters on his hand at the time, and when he was ordered to make the joints in the pipe he pointed out to the foreman that a blister had burst, and that it was hardly safe for him to do the work because of the red lead used in the joints. The foreman said, "You must go. I must have the engines working this afternoon." He went to the work, and had the engines working at half-past three. His Honour: What happened to you? Witness: This blister having burst, some of the mixture got into it. Next day he found his hand got worse, and he had to poultice it. He worked until Saturday, the 22nd of the month. His Honour (to applicant's counsel): That will do. Mr. Hopkins, where's your case here? If the words of the Act of Parliament were "from any injury sustained" there might be a case, but it says "from injury arising from any accident." There is injury here, but no accident. Mr. Hopkins: I submit there is. His hand came in contact with the piping. His Honour: Have you got a dictionary here? The Clerk (Mr. Grimshaw): We have a small one. His Honour: An accident means some untoward, unlooked-for thing, something happening out of the ordinary course. If I am working at a saw and my hand gets into it there is an accident, because my hand was never intended to be there. If red lead and oil are used in making a joint the thing which is important is the state of the person's flesh at the time. The applicant knew he had a blistered hand. Looking at the dictionary which was now brought into court, his Honour said: The dictionary says an accident is "an unexpected event or chance." Where is the unexpected event here? Mr. Hopkins: The unexpected event was the contact between his finger and a poisonous material. His Honour said this would be going far beyond the scope of the Act. What was dangerous to one man was not dangerous to another who had not got an open sore. Mr. Hopkins: The employer takes the risk of that. I submit this is an accident because it was not normal. His Honour: You see the injury must be an accident, and about the "accident" we differ. Mr. Hopkins: I submit where a man is ordered to do certain work and an injury results to him that that is *primâ facie* an accident. His Honour: I am very sorry for the man, but there is no case here.

TRADE NOTES.

Death of Mr. W. Stiff.—We regret to announce the death of Mr. W. Stiff, senior member of the firm of Stiff and Son, of the Albert Embankment Potteries. The deceased, who was 62 years of age, was the son of the late Mr. J. Stiff, a pastmaster of the Loriners' Company.

Funeral of Mr. George Pearson. — The funeral took place on July 25th, at Oldswinford Church, of Mr. George Pearson, of Thornhill, a partner in the firm of Messrs. Harris and Pearson, fire-clay manufacturers. A great number of mourners and immediate friends were present. The clerks from the works were also present, and the bearers were old workpeople of Messrs. Harris and Pearson.

Death of an Elland Brickmaker.—We regret to announce the death of Mr. David Sharratt, of Elland, head of the firm of Messrs. D. Sharratt & Sons, brick and tile manufacturers, who died at Southport, on August 7th, at the age of 70. Mr. Sharratt, who had been in failing health for several years, had been residing at Southport for the last few months. He was widely known and very highly esteemed.

Appointment.—Mr. Philip Kirkup, who has for the last twelve years been manager of the Cornsay Collieries, Durham, and the fire-brick, sanitary pipe, and gas retort works of Messrs. Ferens and Love, has been appointed chief manager of the Birtley Iron Company's collieries, near Newcastle-on-Tyne, in succession to Mr. Thomas Heppell, who has resigned owing to ill-health. Mr. Kirkup has for some years been an active member of the Board of Guardians and the District Council of Lanchester, being at present chairman of two or three committees dealing with technical matters. Mr. Kirkup leaves Cornsay with the good wishes of his many friends in the western part of the county of Durham.

Developments at Exeter.—It is stated that a great scheme of extension has been resolved upon by the proprietors of the Poltimore Patent Brick and Tile Works at Pinhoe, Exeter. For years the demand for the products of these works has been far in excess of the ability to meet it, and it is calculated that orders to the extent of several million bricks a year have had to be declined in consequence. That these bricks are in such great request is due to two causes—the natural excellence of the clay from which the bricks are made, and the possession of patent machinery and appliances which enable the highest possible class of goods to be turned out. So pressing and numerous have been the orders received that the principals recently met to consider the situation, and it was decided that, as the firm owned practically the whole of the clay deposit in the neighbourhood, the works should be extended. The scheme resolved upon is a very comprehensive one, and will involve the expenditure of a large sum of money, and inasmuch as the receipt of orders exhibits a constant tendency to increase, it will be proceeded with at once. It is gratifying to find a local industry being developed in this fashion, and the proprietors are to be congratulated on having built up such a reputation for themselves.—*Western Daily Mercury.*

A Conference has been held at the Home Office in reference to the report by Professor T. E. Thorpe, LL.D., F.R.S., and Professor Thomas Oliver, M.D., F.R.C.P., on the employment of compounds of lead in the manufacture of pottery. Sir Kenelm Digby who was accompanied by Mr. H. H. S. Cunynghame, Dr. Whitelegge, Dr. T. M. Legge, and Mr. G. A. Aitken) represented the Home Office. The manufacturers present (who were introduced by Mr. Woodall, M.P., and Mr. Coghill, M.P.) included representatives of Minton's, Wedgwood & Sons', and Doulton's.

Sir Kenelm Digby, in opening the conference, said that the report of Professor Thorpe and Professor Oliver had shown that the terrible evil of lead poisoning required to be dealt with by more effective measures than were at present enforced, and also pointed to the conclusion that it was an evil which could be stopped. The question was—What was to be substituted for the use of raw lead? There were different kinds of frits, some harmless and some not. In what way could an adequate security be given that the frit used should be of a harmless character? The Home Office had no reason to be dissatisfied with the special rules made last year, so far as they went; but they did not go far enough.

Mr. W. Burton, of Pilkington's, said the manufacturers present had agreed to abolish entirely the use of raw lead in glazes for majolica, china, and earthenware; but in regard to the colours for enamelling, those were not made by the pottery manufacturer, but by the colour maker, who was entirely outside the Home Office rules. Again, most of the lithographic transfers used in this country were not made by the potters; and many of the cases for which the potter was blamed were entirely due to the manufacturer of the lithographic transfers. There could be no one substitute for white lead; but the manufacturers had offered to use fritted lead in place of the raw lead. It was quite out of their power to consent to be tied down to one silicate; and they wished that Professor Thorpe and Professor Oliver should be authorised to proceed with their researches, and to confer with the manufacturers upon the subject of an effective but harmless frit. If those gentlemen would indicate a certain number of compound silicates of lead which in their opinion were tolerably harmless, the manufacturers present would produce those silicates on a commercial scale and try them in all their factories. Several of them had for years been fritting their lead in advance of public opinion, and it was only fair that their methods should be thoroughly examined before they were condemned. Nearly 20 years ago some of them tried leadless glazes, but they had been compelled to abandon them. In regard to medical inspection, he proposed that the present rule, which applied to women and children, should be extended to all persons employed.

Mr. F. Rawdon Smith (Craven Dunnill & Co.) said that 211 manufacturers were represented at the conference, and they represented more than 50 per cent. of the turn-out and of the capital engaged in the business. There were a great number of industries which supplied them with materials, which were not now scheduled as dangerous trades, but which ought to be included. He admitted that the 1898 rules required supplementing in some points, but on the whole sufficient time had not yet elapsed to enable them to see how they would work. The inspectors ought to be increased.

Mr. F. R. Benham (George Jones & Sons) said that the alterations which had been suggested in consequence of the report would seriously interfere with the business. The English pottery was the most expensive in the world, but where prices were about equal, English manufacturers held their own, largely because they were able to give a guarantee that all their pottery should be replaced free of charge if it gave way in the body or in the glaze. They would be running a fearful risk if they were to be compelled to send out every year a large quantity of goods manufactured with new mixtures of which they had not had proper time to test their wearing capacity.

Sir Kenelm Digby said that the proposal for a conference between the experts of the Home Office and the manufacturers upon the question of the practicability of an efficient and harmless frit should have very careful consideration. He thought experience was beginning to tell in favour of the use of leadless glazes. It was not the desire of the Home Office to force rules upon any branch of industry without having taken every possible means of ascertaining the views of both employers and operatives; and he assured the gentlemen present that every weight would be given to the representations they had made.

Mr. Woodall thanked Sir Kenelm Digby for his patience and courtesy, and the conference then terminated.

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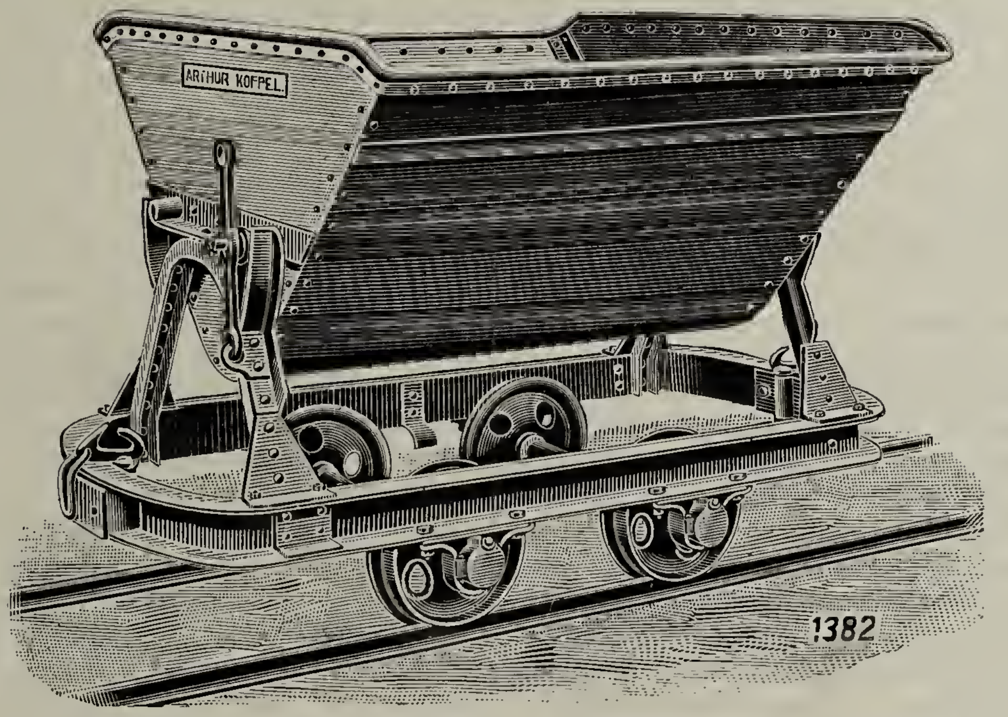

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TRADE NOTES—*(Continued).*

A New Industry in Teesdale.—The Lords in Trust of Bowes Moor have entered into an agreement with a Middlesbrough firm for the supply of ganister, which is extensively used in the manufacture of firebricks. This mineral has been found to exist in very large quantities near Spital, and, for the conveyance of the stone by rail, it is proposed to put in a siding on the South Durham and Lancashire Union Railway. The development of the working will afford employment for a large number of people.

New Brickworks at Wincobank.—On July 17th, a tea and entertainment were given to the workpeople, their wives, and friends, by Messrs. Kaye and Darwin and Mr. George Greaves, to celebrate the opening of the new brickworks at Wincobank. About 100 sat down to tea. After tea, Mrs. Kaye and her daughters, with Mrs. Darwin, proceeded to the new kiln and lighted the fires, and sent the first smoke up the new chimney. Mr. Cooper, the foreman, set the machinery in motion, and the ladies watched with much interest the process of brickmaking. After inspecting the coal mine now being opened adjoining the works, the company returned to the schoolroom. Mr. Greaves presided, and proposed success to Messrs. Kaye and Darwin in their undertaking. Mr. David Haigh seconded, and the proposition was passed with acclamation. Mr. Kaye, in reply, said in starting those works they hoped to make a profit for themselves; at the same time it was their desire to do everything possible to prevent any annoyance to any one, and he hoped it would be a benefit to the neighbourhood and that masters and men, and neighbours and friends, would always cherish the best of feelings towards each other.

Where Chinese Porcelain is Made.—A correspondent of a Shanghai journal recently paid a visit to Kintê-chen, a city which is renowned as the only place in which Chinese porcelain is made. He describes it as about 120 miles south-east of Kin-kiang, the well-known treaty port on the Yang-tsze. Half the year it is accessible by large boats, and for the other half only smaller craft can reach the city. It lies in a natural basin or valley, with mountains all round, and is one of the busiest and dirtiest cities in China. The area of the valley being limited, the houses are crowded up close together, and the streets only 6ft. wide. The officials put the population at half a million, but it is probably much greater. The population is composed of immigrants from all the 18 provinces of China. Over a thousand shops deal in nothing but porcelain, and the annual exportation is estimated at about a million sterling in value. Great highways from nine of the 18 provinces cross at Kintê-chen. The material for the porcelain is obtained in the prefecture, but a fine quality of white clay is got from Nang-kang-fu on Po-yang lake, while the colouring for the porcelain comes all the way from Yun-nan. Over a hundred kilns are kept busy and 300,000 men, women, and children. A kiln takes three days to burn out and is charged on the average 86 times a year. The correspondent inquired why porcelain was made only here, seeing that those connected with the manufacture came from all parts of China, and was informed that the dryness and lightness of the atmosphere of Kintê-chen were unmatched elsewhere in the empire, and as both of these qualities were of great importance in successfully producing the best porcelain, the art had become confined to that city. Formerly the kilns were scattered about the neighbourhood of Kintê-chen, but had gradually all been concentrated there, as the ware produced was better there than elsewhere. The city has been the seat of porcelain manufacture for 2,500 years, and it is said that no improvements have been made in the methods during that long period. The workmen are very expert and rapid—the time occupied by the clay for a large flower vase on the turning lathe until it was ready for the first burning was only two-and-a-half minutes, and the whole population is industrious, prosperous, and well-disposed towards foreigners. The correspondent concludes by recommending railway syndicates to keep the city in view, for a line touching it would largely control the carriage of the porcelain throughout China. It is near the green tea district of south-western Annui and eastern Kiang-si, and the black tea districts of north-western Fu-khien, and still nearer to the great coal region along the Kuan-sin river.

Municipal Brickmaking at Glasgow.—The special Sub-Committee on Utilisation of Clay in Lands of Easter Blochairn have had before them a report by Mr. David Rankine, C.E., and Mr. Foulis. It states:—"There have been a large number of bores put down, and several pits sunk on the lands of Easter Blochairn, for testing the subsoil of the site upon which the new gasworks are to be erected upon these lands. The journals of bores have been considered, and the pits examined by us, so that we might advise as to whether the clay disclosed therein is suitable for brickmaking, and whether it is advisable for the Corporation to make it into bricks for the construction of the said new gasworks. The clay is light-coloured blue boulder clay, and interspersed with small stones. It has been tested at Possil Brickworks in practical manufacture, and makes a palish red-coloured brick of good quality for general building purposes. In connection with the erection of the purifiers at the new gasworks, there will be a surplus excavation of about 136,500 cubic yards of this clay, which would produce about 40,000,000 bricks. At other places there will also be surplus excavations of similar clay, and the quantity might be otherwise greatly increased if that should be found expedient, as there is a great depth of clay. There is no place of deposit on the lands for the surplus excavations, and it is apparent that, if they have to be taken to other lands, expense will be incurred corresponding to the distance to which they may have to be carried. There will be a large quantity of bricks required in the construction of the new gasworks, one of the gas-holder tanks alone requiring about 4,000,000. If the surplus excavations were made into bricks, the following economies and savings would be effected:—(1) Expense of removing the surplus excavations to other lands, which might be moderately put at 1s. per cubic yard; (2) carriage of bricks from brickworks situate some distance from Blochairn, which might be put at not less than 1s. per ton, or, say, 4s. 6d. per 1,000 bricks; (3) the lordship which makers have to pay to proprietors on the clay made into bricks, and which may be taken at 9d. per 1,000 bricks. These three items, which make no allowance for makers' profit, would amount, on 40,000,000 bricks, to £17.325. If brickworks were to be erected on the grounds, they would have to be of a capacity that would use the surplus excavations quickly. Two machines, worked single shift, would produce 5,500,000 bricks a year, and, if double shifted, 11,000,000. The only extra plant needed for double shifting is increased kiln accommodation. On careful consideration of the whole matters, we would recommend that a work be erected consisting of two machines, with Hoffmann kilns, equal to the production of 11,000,000 bricks per annum, and this we estimate could be done for £8,000. It is apparent from what is herein contained that such a work would facilitate the erection of the new gasworks, would provide a brick well suited for use on the grounds, and would leave a large margin of profit in addition to paying the cost of the erection of the brickwork.

The sub-committee, having fully and carefully considered the remit made to them, along with the report now submitted, and having regard to the great saving which will thereby be effected by the Corporation, resolved to recommend (1) that the plant referred to in the report be put down and worked by the Corporation upon said lands for the purpose of utilising the clay found therein for making the bricks which will be required in the construction of the new gasworks there; and (2) that Mr. Rankine be employed to prepare the necessary plans and specifications for the plant and any requisite buildings, and to superintend the putting down of the plant and the erection of the buildings; and that Mr. Foulis be authorised to obtain and submit offers for providing the plant and erecting the buildings.

THE LAW.

The Collapse of a Brick Kiln: Harrison *v.* Trafford Brick and Tile Company, Limited.—In this case the plaintiff, Henry Harrison, claimed £100 from the defendant Company for the use of a patent and for his services. The defendants in their pleadings said it was agreed between them and the plaintiff that they should erect a brick kiln according to plaintiff's patent, and that plaintiff should superintend the erection for the sum of £100; that they were induced to make this agreement by a warranty on the part of plaintiff that the kiln would make 100,000 bricks a week, which had failed; that the plaintiff negligently conducted the building of the kiln, which afterwards collapsed; and they counter-claimed for damages. The plaintiff, in reply, denied the allegations of the defendants. Mr. Taylor, Q.C., Mr. Langdon, and Mr. Hogg were for the plaintiff, and Mr. Sutton and Mr. Acton appeared for the defendants.—Mr. Taylor stated that plaintiff made a bargain with the Company that they should pay him £100 for his services in connection with certain plans he possessed of a brick kiln which he furnished to them. In May, 1898, plaintiff got into communication with Mr. Nuttall, a director of the Company, who went with him to Parkfield, where a kiln had been erected by Harrison. Mr. Nuttall approved of the kiln, and at a meeting of the Board of the defendant Company the plaintiff produced the plan of the Parkfield structure. He was asked how many bricks the kiln would turn out per week, and he replied that he could not say, because that depended on many circumstances, but the Parkfield kiln turned out about 100,000 bricks a week. They made a bargain with him that he should lend them his plans, and that he should superintend the construction for £100. They resolved to provide the labour and materials themselves, as the tender of a contractor was regarded as too high. The bargain was embodied in a resolution of the 24th May, and there was no reference in that to the alleged warranty on the part of the plaintiff. In the course of construction water got into the main flue of the kiln, which arose from the nature of the site on which the kiln was erected. The site was not selected by the plaintiff, but by the defendants. On the advice of the plaintiff the defendants drained round the sides of the flue and filled up the drain with broken bricks. The kiln was then completed satisfactorily in September, and it worked well. Mr. Nuttall was quite satisfied. Later when plaintiff asked for his money Mr. Nuttall asked him to wait, and said the kiln was not burning the desired quantity of bricks. Plaintiff argued that that was due to the Company using inferior slack. In January there was a recurrence of the water in the main flue, but for that plaintiff repudiated responsibility and repeated his former advice. In March, 1899, the shaft built over the main flue went down. That was due entirely to the percolation of water in the main flue, which affected the retaining walls and the mortar in the arch.—The plaintiff bore out the statement of his counsel, and said he had not taken out a patent, because he had found that his design had been anticipated. After evidence for the plaintiff had been called—Mr. Sutton stated that the defence was that the kiln had been constructed inefficiently.—Mr. Edward Nuttall, an associate member of the Institute of Civil Engineers, chairman of the directors of the defendant Company, stated that, in his opinion, the collapse of the kiln was due to the expansion and contraction of the two arches, which were joined together from the point of springing. When the kiln was lighted it was hot at one side and cold at the other. The cost of making the kiln good had been £328. There was no provision in plaintiff's design for contraction and expansion.—A large number of witnesses were called to show that the collapse of the kiln was due to imperfect construction. It was stated that the main flue had been quite dry since November last. After some discussion between the jury and his Lordship as to whether the plans showed the joining of the arches in one shaft on the crown of the main flue, the foreman of the jury said the defendants seemed to have got what they asked for. The jury, he added, were very much surprised to find that Mr. Nuttall and other directors of the Company, who were civil engineers, appeared not to have known what they were getting. Mr. Sutton said the issue the jury had to decide, put broadly, was whether the kiln collapsed through the mortar being steamed and washed out by water, or through the mortar being ground out by the expansion and contraction of the arches. The allegation of a breach of the warranty to turn out a hundred thousand bricks per week was abandoned, as it had been admitted that the defendants had placed only partially dried bricks in the kiln.—The judge said the two questions he proposed to put to the jury were—First, whether the contract was for the ditto of Parkfield kiln or a kiln of that general type capable of producing so many bricks per week, for though Mr. Sutton had said that, supposing there was a contract to make 80,000 or 100,000 bricks per week, he could not, under the circumstances, ask for damages for a breach of that undertaking, yet that did not dispose of the question whether that was the nature of the contract; and, secondly, Did the arch collapse from its inherent defects or from water, steam, or other causes for which plaintiff was not responsible?—Both counsel agreed to the terms of the questions.—Mr. Taylor then addressed the jury, and claimed that the plaintiff had carried out the very work that he was asked to do, and that it was too late to object to the design of the kiln.—In summing up his Lordship said the theory of expansion and contraction certainly appealed to his reason as against that of the loosening of the mortar by steam and water.—The jury considered the questions put to them by his Lordship for ten minutes, and returned the following answers:—"Was the contract for the ditto of Parkfield kiln?' "Yes." They abandoned the second portion of the question. "Did the arch collapse from inherent defects?" "Yes, for which plaintiff was not responsible."—The Judge said he thought the jury were right in regard to both questions. Their second answer was immaterial, because the first answer settled the verdict. He gave judgment for the plaintiff for £100, and judgment for the plaintiff on the counter-claim.

Action by a Father against his Son.—William Nield, a retired farmer, of Talke-of-the-Hill, near Kidsgrove, sued his son, Frank Nield, to recover £200 on a promissory note. Mr. Plumptre was for the plaintiff and the defendant was unrepresented by counsel, and did not himself appear. Mr. Plumptre stated that, early in 1893, the defendant wished to embark in business in connection with some brickworks, and he asked plaintiff for a loan of £200 to enable him to do so. On April 11, 1893, the plaintiff lent his son the money, and the defendant gave him a promissory note. Formal evidence was given, and the jury returned a verdict for the plaintiff for £200. Judgment was entered accordingly.

Commission on Brickmaking Machines.—Smith *v.* Alexander & Co.—In this case Mr. Wallace, Q.C., and Mr. Felix Palmer were for the plaintiff, Mr. Thomson Smith, colliery furnisher and ironmonger, Dunfermline; Mr. Tindal Atkinson, Q.C., and Mr. Bairstow for the defendants, Messrs. Herbert Alexander & Co., manufacturers of brickmaking machines, Leeds. The action was to recover £135 commission on two brickmaking machines. It was stated on behalf of the plaintiff that in November, 1897, the defendants wrote to him saying they would be pleased to hear if he could do anything to place orders with them. He replied that he expected to place an order for a brickmaking machine. As the result of the correspondence, Mr. Woodhead, defendants' traveller, went to Dunfermline and saw the plaintiff, and arranged with him that he should have 10 per cent. commission on any orders he should place. Plaintiff mentioned the name of Mr. Street as a likely customer. That gentleman was the managing director of a brickmaking company near Dunfermline, in which plaintiff had a small share. The price of a machine was discussed with Mr. Woodhead, and £750 was mentioned by him. It was also stated that Mr. Street would probably require a second machine. On December 10th, the day after Mr. Woodhead's visit, the plaintiff wrote to the defendants asking for estimates and specifications. These were sent, the price agreed to for one machine being £750, and defendants offered plaintiff 10 per cent. commission if he placed the order with them. Plaintiff wrote that he would get an order for two machines. On the 29th Mr. Woodhead went to Dunfermline and saw the plaintiff and Mr. Street, and offered to supply the two machines for £1,350. Mr. Street said he might as well give his order direct to Woodhead, and that plaintiff would get his commission from the defendants. After the interview, and after Mr. Woodhead had received the order, he asked, as the price was cut very fine, if plaintiff would consent to take 5 per cent. commission instead of 10 per cent. Plaintiff declined to do so, and defendants refused to pay him the commission agreed upon, their defence being that the orders had not been sent direct to them, and that what he demanded was secret commission. The jury found for the plaintiff for the amount claimed.

Damaging Brick Machinery.—Annie Davies (22), Maggie Davies (17), and Ellen Davies (20), labourers, were indicted for maliciously damaging, with intent to destroy, a brickmaking machine, the property of the Glamorgan Coal Company, Limited, at Llwynypia. The women were employed at the brickworks connected with the colliery. During the hearing it transpired that P.C. Bowen had obtained statements from the girls by telling them that if they told stories about the matter it would be worse for them, and they had better tell the truth. The judge said unless an accused person were cautioned and people made a confession in order to escape prosecution the evidence was not admissible. The statement was thereupon excluded. Inspector Hoyle said he charged and cautioned the prisoners, and they made incriminating statements, Annie Davies saying they were put up to do it by Sid. Meyrick, who gave them money for doing it. Meyrick had been foreman at the works for many years, but was not at the time the damage was done. In defence a witness was called, who said she heard Meyrick ask the girl Annie Davies to do the damage. The girls were all found guilty, but strongly recommended to mercy. The Judge said the prisoners were liable to penal servitude, for the offence was a very serious one. Machinery must be protected ; but he would pass on them the lightest possible sentence, which was 14 days' hard labour. On hearing the sentence the youngest prisoner fell back into a faint and the others burst into tears. A very affecting scene followed, and it was several minutes before the prisoners were removed from the dock.

The so-called Brick-burning Nuisance.—The Local Government Board have written to the Tottenham (London) District Council enclosing copy of a communication from Mr. W. E. Smith about the nuisance caused in Williamson's brickfields in that neighbourhood. The Clerk said the Local Government Board knew all about it, and therefore did not ask the Council's observations on the subject. The Council had taken action in the High Court over the matter and lost it, as the evidence did not show there was a legal nuisance.

COMPANIES' MEETINGS.

Leeds Fireclay.—The report of the directors of the Leeds Fireclay Company, Limited, for the year ended June 30th, states that, after charging £8,000 for interest on debentures to June 30th, the divisible profit, including £6,468 brought forward from last year, amounts to £82,733. Deducting interim dividends paid, there remains a balance of £54,733, less (dividend at the rate of 6 per cent. on the preference shares, paid on July 1st, 1899) £18,000, leaving £36,733. This the directors propose to deal with as follows :—To pay a dividend on the ordinary shares for the six months ended June 30th, 1899, at the rate of 7 per cent. per annum, making, with interim dividend, 6 per cent. for the year (payable September 1st), £14,000 ; to carry to reserve fund (making that fund £100,000) £11,000 ; and the balance forward to next account, £11,733. During the year additional investments of the reserve fund have been made in freehold lands in Leeds and Huddersfield, as well as in shares debentures, etc., of other, companies, amounting in all to £47,464. The directors have entered into contracts for the erection of an engineering shop at Wortley, which will enable them to contract for the complete installation of gas plants, and which they anticipate will prove beneficial to the company. The buildings, plant and machinery have been well maintained and are in good condition. At present the whole of the works are fully employed. Satisfactory arrangements for the management of the various works have been made for a further period with Messrs. W. D. Cliff, Newton Brooke, William Ingham, James Holroyd and H. Norman Brooke, being the same gentlemen who have conducted the works in past years.

NEW COMPANIES.

Heene Brick Company, Limited.—Capital £10,000, in £1 shares. To acquire and carry on the business of a brick maker now carried on by J. H. Rafferty at Worthing.

Palmers, Limited.—Capital £5,000 in £10 shares. To carry on the business of brick and tile manufacturers, clay and marl merchants &c. Registered without articles of association.

Exeter Brick and Tile Co., Ltd.—Registered 31st July. Capital £10,000, in £5 shares. Objects : To carry on the business of brick and tile makers, builders' merchants, &c.

Auchencarroch Quarry Co., Ltd.—Registered at Edinburgh 31st July. Capital £3,000, in £10 shares. Objects : To carry on the business of quarriers, brickmakers, builders and contractors.

Wickford Brick and Tile Company, Limited. — Capital £10,000 in £1 shares. To acquire and carry on the business of a brick and tile maker now carried on at Downham and South Hanningfield, Essex, by J. S. Maryon.

Sturbridge Brick Co., Ltd.—Registered 1st August. Capital £20,000, in £1 shares. Objects : To adopt an agreement with C. Hobson for the acquisition of a freehold brickfield, near New Market Road, Cambridge, and to carry on the business of brick and tile merchants, &c.

London Building Trades Supply Co., Ltd.—This company was registered on 27th July, by W. H. Carlton, 11, Queen Victoria Street, E.C., with a capital of £1,000 in £1 shares, to carry on the business of brick and tile manufacturers, timber and iron merchants, &c. Table A mainly applies.

The Lantern China Clay Co., Ltd.—Capital, £8,000 in £1 shares, to adopt an agreement with J. F. Pagen and A. Helder, and to acquire and work any china clay beds, quarries, works, &c., in Cornwall. The number of directors is not to be less than two nor more than five. The first are A. Helder and J. F. Pagen.

Royston Cement Company, Limited.—Capital, £65,000 in £1 shares. To acquire the businesses of cement manufacturers, lime-burners, brick and tile makers, &c. The first directors are to be elected by the company. Qualification, £100. Remuneration, £100 per annum (chairman, £150) with a percentage of the profits, divisible.

Lim Brick Company, Limited.—Capital £5,000, in £1 shares. To acquire certain lands and buildings at Limbrick Lane, Hilboro', Sheffield ; and to carry on the business of brick manufacturers, gannister merchants, quarrymen, &c. Registered without articles of association. Registered office, 12, Cross Turner Street, Sheffield.

Huddersfield Brick, Tile, and Stone Company, Limited.—Capital £12,000, in £10 shares, to carry on the business of brick and tile manufacturers and merchants, quarry-owners. The number of directors is not to be less than two nor more than five ; the first are Lewis Radcliffe, Alfred Radcliffe, John W. Mallinson, and Samuel Jury. Qualification fifty shares. Remuneration as fixed by the company. Registered office, Hillhouse Lane, Huddersfield.

Cranham Brick & Tile Company, Limited.—Capital, £5,000 in £1 shares. To adopt an agreement with J. G. Broodbank and C. H. Broodbank, and to carry on the business of brickmakers, builders, &c. The first directors (to number not less than three nor more than six) are J. S. Broodbank, C. H. Broodbank, C. H. Sankey, T. P. Robson, and W. F. French. Qualification, £100. Remuneration, quarter of the net profits after ten per cent. is paid. Registered office : 7, Martins Lane, Cannon Street, E C.

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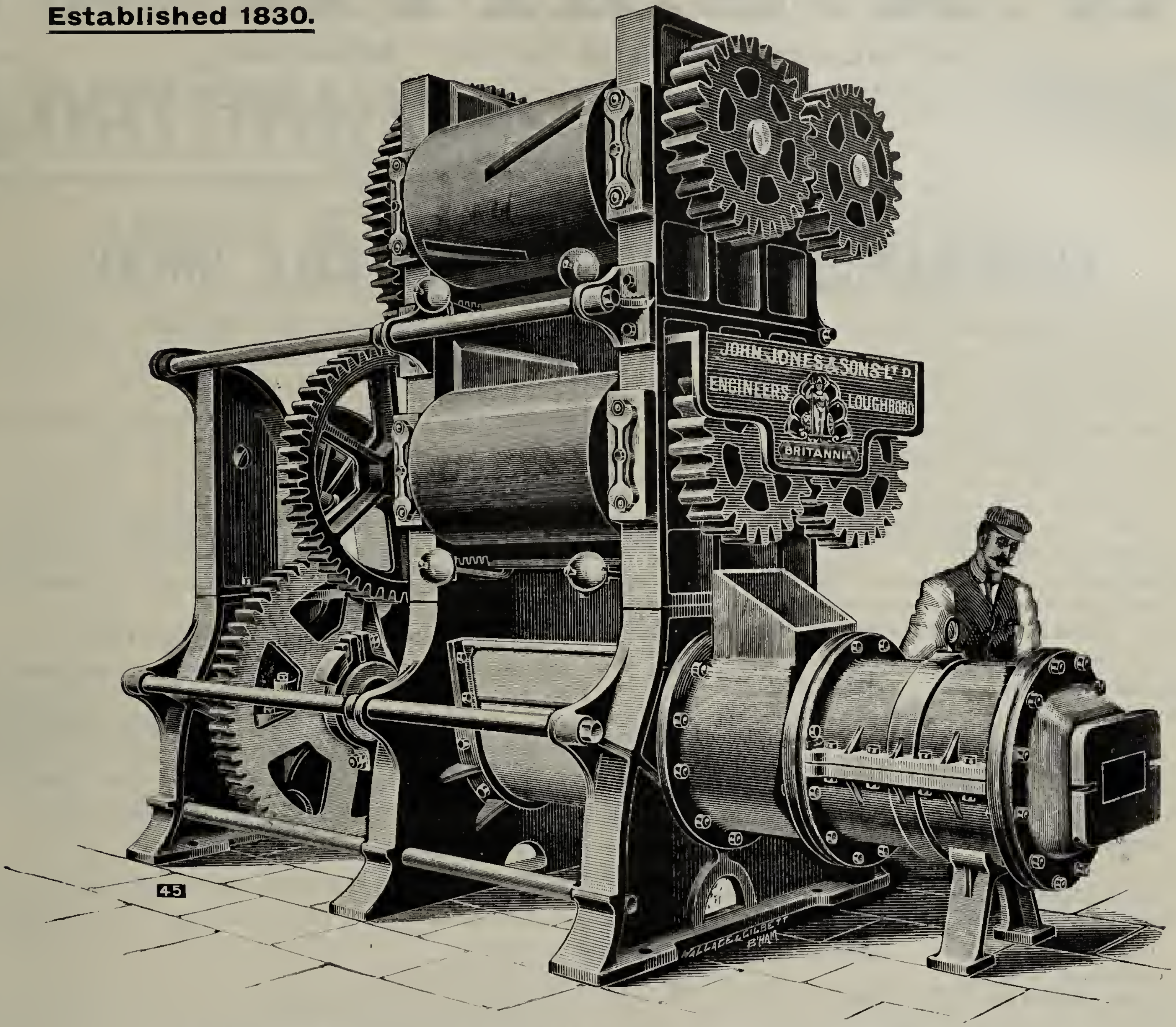

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NEW IMPROVED BRICKMAKING MACHINE, for steam power, with Vertical Pugmill, of strong cast-iron sectional plates (can be made of steel plates if desired at a slight extra cost), complete, with expression rolls, lubricating brick die, cutting-off table, &c. This machine has double purchase spur and bevel gearing, and the expression rolls are driven direct from main shaft by spur gearing. It is mounted on strong cast-iron bed plate, and is fitted with my Improved Cast Steel Knives, and improved adjustable top thrust bracket.

NO. 7A BRICKMAKING MACHINE by Whitehead, with rolls overhead, and hoisting gear, cutting-off tables, &c., complete.

Two No. 7 HORIZONTAL MACHINES by Whitehead, with crushing rolls, dies and cutting-off tables complete.

Large SCREW QUARRY PRESS by Pullan and Mann.

One nearly new powerful MACHINE by Sampson & Sons, two pairs of top rolls, one plain and the other corrugated, all complete for an output of 20/25,000 per day.

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Portable BRICKMAKING MACHINE by Bedford Iron Co., horizontal pug, mouthpiece, die, and cutting-off table, complete.

Set Ditto Ditto, rolls, 34 in. × 18¾ in.

Set Expression Rolls, gearing, housings, mouthpiece, &c., all complete.

Vertical Pug Mill, all iron, for steam power.

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CLAYTON, HOWLETT & Co.'s A3 HORIZONTAL MACHINE, thoroughl overhauled, rolls 30in. long, 20in. diameter, die and table complete.

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JOHNSON'S HORIZ. MACHINE, with two pairs of rolls, massive throughout, complete, practically new.

SET CRUSHING ROLLS, 24in. by 18in., complete for work.

CLAYTON HOWLETT & Co.'s WASHMILL and set of Elevators complete.

CLAYTON HOWLETT & Co.'s "one process" BRICKMAKING MACHINE, complete with die and table.

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No. 4 Hand Power Pipe and Tile Machine, Bedford Iron Co. type, complete with cutting-off table.

No. 3, Ditto ditto

No. 2, Ditto ditto

Several VERTICAL PUG MILLS for animal power.

BRICKMAKING MACHINE, consisting of vertical pugmill, die, and cutting-off table, for animal power.

IMPROVED HAND BRICK PRESS, with screw action from below

CLAY PANS, &c.—

5 ft. 6 in. Under-driven Pan, rolls 2 ft. 6 in. diam., by Mason Bros.

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9 ft. Perforated Pan, complete, and in excellent order; over-driven.

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100 yds. PORTABLE RAILWAY, 2 ft. g., consisting of steel flanged rails, 14 lbs. per yard, and steel sleepers with clips, pressed out to receive rails, and made expressly for this section of rail.

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New WHEELING PLATES, 6 in. × ¼ in., in stock.

New BARROWS and CLAY WAGONS. List on application.

Specially prepared BRICK OIL that will not destroy the colour of bricks.

Best Sheffield Piano steel wire.

Best quality FUSTIAN for lining dies.

Hand, Horse Power, and Steam PUMPS.

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HORIZONTAL, VERTICAL, PORTABLE, and SEMI-PORTABLE ENGINE, and BOILERS always on hand. Customers are requested to kindly STATE THEIR REQUIREMENTS in this direction, and they will receive offers of the most suitable Machinery I have to meet their wants.

Specially repaired and in stock—READY for immediate delivery—one each 8 H.P., 9 H.P., 10 H.P., and 12 H.P. PORTABLE ENGINES, all THOROUGHLY OVERHAULED.

Complete Brickyard Plants Estimated for.

Discarded or Surplus Plants Purchased in any part of the United Kingdom.

Inquiries for Machinery of every description receive prompt attention.

The "MANCHESTER" Continuous Kiln.

(Dean & Hetherington's Patent.)

This Kiln is superior to all others for Burning High-class Facings and Moulded Bricks, Terra-Cotta, Chimney Pots, Tiles, Quarries and other articles.

PRACTICAL MEN state it to be the only Continuous Kiln which has been known to turn out really High-class Goods, superior to any Down-draught Kiln (see Testimonial below).

THE UNRIVALLED ADVANTAGES OF THIS KILN.

It is far ahead of all others for the thorough drying of the goods whereby the finest colour is ensured. Green Bricks can be set as soon as they are hard enough for piling, and will come out of the kiln (after being treated with our hot-air drying system) of a beautiful tint, without any stain, and ***absolutely free from Loss or Waste.***

Our arrangement for the outlet of all steam and vapour from each chamber is altogether the most scientific in principle and effective in working that has been adopted in any kiln that has ever been erected on the continuous system. In **all other** continuous kilns the steam has to travel the whole length of the chamber **through all the goods** before it can get away: this very serious defect is entirely overcome in the "Manchester Kiln."

This kiln effects an economy in fuel of from 50 to 80 per cent. on any ordinary up and down-draught kiln. Our system insures perfect combustion, as may be seen from entire absence of smoke from chimney.

TESTIMONIAL.

The Redhill Bank Brickworks, Rocester, Staffs.,
May 27th, 1899.

Dear Sirs,—We have great pleasure in bearing testimony to the satisfactory working of the "Manchester Kiln" for the time we have had it in use, which is about nine months. The saving in fuel, as against the ordinary down-draught kiln, is a wonderful item. The goods come out a deal better in colour, and I may say are giving great satisfaction to our customers everywhere they go.

Yours truly,
A. HEWINS.

Messrs. Dean, Hetherington & Co.

Kilns are now being erected for—

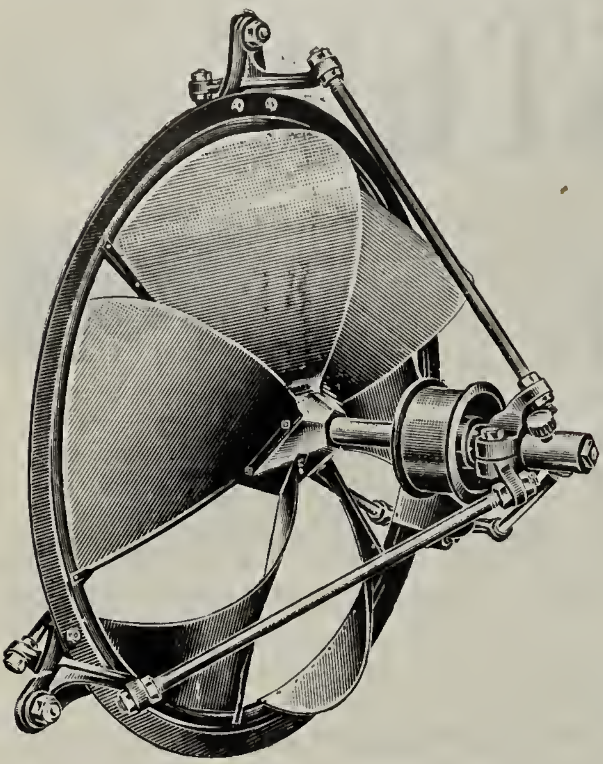
Messrs. HARRISON & Co.,
Anslow, Near Burton-on-Trent.

and

Messrs. A. R. BULLIVANT & SONS,
Moston Lane, Blackley, Manchester.

Manufacturers contemplating the erection of New Kilns should write for full particulars to the undersigned Patentees, who have had 30 years' practical experience in Brickmaking and Burning, and are in a position to thoroughly explain and work their system.

DEAN, HETHERINGTON & CO.,
WALL GRANGE,
STOKE-ON-TRENT, STAFFS.



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Is the most natural and best adapted for the successful treatment of all clays which, however tender, can be dried by it without cracking. Trolley system or open rooms.

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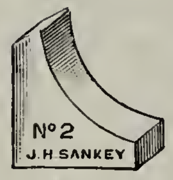

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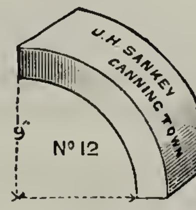
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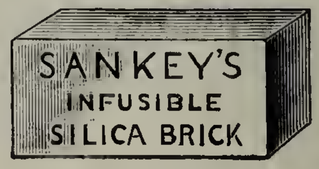

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Sole Manufacturers of F. GILMANS "Peritherma" Non-Conducting Composition and the Crown Boiler Fluid for the prevention and removal of Incrustation in Steam Boilers.

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Experienced workmen can be sent from our works to cover Boilers, Steam Pipes, etc., in any part of the United Kingdom, with F. Gilman's "Peritherma" Non-Conducting Composition, or we supply this Composition in casks of about 5 cwt. each, ready mixed for application. Printed instructions are sent with each consignment, enabling any ordinary workman to put it on.

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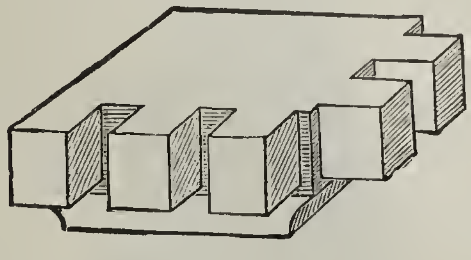

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BRICK WORKS, about 35 ACRES FREEHOLD, close to London. Clay inexhaustible, now making excellent Sand Facings and Wire Cuts. An exceptional opportunity of acquiring a genuine going concern which offers unlimited means of extension.—Apply to the Messrs. LUMLEYS, of St. James's House, 22, St. James's Street, London, S.W.

BRICKYARD FOR SALE, red and white earth; large profit on goods; sold through affliction; will sell cheap.—Apply "Profit," c/o this journal.

BRICKS AND PORTLAND CEMENT. FREEHOLD PROPERTY of 300 acres, for sale or let on royalty, on tidal river, 70 miles from London; good material both for bricks and cement.—For further particulars apply "Portland," 43, Essex Street, W.C.

TO BRICKMAKERS.—TO BE LET, near a Railway Station, Main Line G.E.R., having a long frontage to the road, about 71 acres of superior brick earth. Good supply of water.—Apply Hastie, c/o *British Clayworker*, 43, Essex Street, Strand.

BRICKMAKING.—TO BE LET, Coal, Fire Clay and Shale Beds, suitable for making best bricks; good railway accommodation.—Apply John Exton, Withnell Mill, Brinscall, near Chorley.

LAND TO BE SOLD OR LET in the immediate vicinity of Dublin, with practically unlimited Material on the site for the Manufacture of the best Portland Cement and Fire-clay Goods. The Clay takes the highest class of enamels.—Address Clay, c/o Eason & Sons, Ltd., Advertising Agents, Dublin.

By Order of the Mortgagees.

HOMINGSEA AND FEN DITTON, CAMBS.

HIGHLY IMPORTANT FREEHOLD ESTATE,

Known as "POPLAR HALL,"

Containing 80 acres, 2 roods, 11 poles,

29a. 1r. 1p. of which are fine old Pasture abutting upon "the River Cam."

It is well-known that the Estate contains Valuable Beds of Limestone, Clay Marl, Brick Earth, and Coprolites, and is well adapted for the purpose of establishing a Brick and Cement Business.

Extract from Report of late Dr. Augustus Voelecker:—"The Sample of Clay Marl from the materials you sent me is Clay Marl, and not Clay. You will notice that it contains a great deal of Carbonate of Lime, in point of fact, it is a natural mixture of Carbonate of Lime and Clay! In my opinion this earth will make, or ought to make, first-class Portland or Hydraulic Cement. The Limestone you will notice contains 84½ per cent. of Carbonate of Lime. On burning it will make a good Lime for Builders' use, but not a Hydraulic Lime, without the addition of a certain proportion of Clay."

Extract from Report of J. West-Knights, F.I.C., F.C.S., County Analyst, &c. From 25 samples of Chalk Marl, the percentage of Chalk (Carbonate of Lime) was 75:—

"I consider these results are very satisfactory, the percentage of chalk contained in the samples are very good; the complete analysis shows that every ingredient required to produce the highest quality of Portland Cement is present in the necessary proportions, and I am of opinion that practically the whole of this chalk marl is capable of being made into cement without any further addition of chalk, and to a great extent without any manipulation before going into the kilns. And I know from previous experience that a very high-class Portland Cement can be made in this very economical manner."

There are large quantities of Chalk Marl in this district, but very rarely is it found to contain so regular and satisfactory a proportion of chalk, for the purpose of cement making, as it does on this estate.

A. M. Robinson & Son have received instructions from the Mortgagees to SELL the above by AUCTION at the "Lion Hotel," Cambridge, on Saturday, August 26th, 1899.

Particulars, Plan and Conditions in due course of the Auctioneers, Head Offices, next Corn Exchange, Cambridge, or of the Solicitors, Messrs. Francis, Francis & Collin, Emmanuel Street, Cambridge.

PROPERTIES WANTED AND FOR SALE.—*Continued.*

ESSEX—BILLERICAY.

G. B. HILLIARD & SON are instructed, owing to the ill-health of the Proprietor, to SELL BY AUCTION, at the Town Hall, Billericay, on Tuesday, August 15th, 1899, at Three for Four o'clock,

THE VALUABLE ENCLOSURE OF LAND known as "THE BRICK FIELD," situated close to the Railway Station, comprising about 5a. 1r. 38p., and containing a quantity of Valuable Brick Earth.

Particulars and Conditions of Sale may be obtained of Messrs. Woodard, Hood, and Thorne, Solicitors, 6, Billiter Street London, E.C., Billericay, and Southend-on-Sea; and of the Auctioneers, Chelmsford, and 54½, Old Broad Street, E.C.

BRICKWORKS FOR SALE; close to Metropolitan Railway in a rising district. All plant and machinery for manufacture of wire-cut bricks, pipes, tiles; presses, etc. Red Facing Bricks a Speciality.—Apply "Red-brick," *British Clayworker*, Essex Street, Strand, W.C.

BRICKS FOR "SALISBURY PLAIN BARRACKS." LAND FOR SALE with a good strata of CLAY.—Apply to C. W. House, Church Farm, Barton Stacey, Micheldever, Hants. (No Agents.)

TO BRICKMAKERS.—For SALE, 200 Acres of good Brick-earth LAND, part of which is of a superior quality, suitable for tiles or glazed bricks. The whole, or portions, would be disposed of. The land is two miles from Nutfield Station, S.E.R., and two miles from Horley on the Brighton line.—For particulars, apply to Messrs. Baker, Blaker and Hawes, 117, Cannon Street, London, E.C.

TO LET on most advantageous terms, a really first-class BRICK WORKS, in complete working order, and close to two Railway Stations, and Main Line; a very good business can be done; Railway runs past the works; Samples of the Clay can be seen in Bricks, Quarries, &c., and to a practical man with one or two hundred pounds, or anyone wishing to start, this is a chance seldom met with.—Apply H. L. Dean & Co., Trentham Road, Longton.

BRICKWORKS.—Hampshire, close to L.S.W. Line. TO BE SOLD at once, FREEHOLD, 27 acres, 15 and upwards of which is excellent red brick earth. Machinery, Plant and Kilns for £3,000, all included—free water. Demand for cottages.—Address or call, Bance, Hunt & Co., 67, Above Bar, Southampton, who can thoroughly recommend same.

SYNDICATE OR PRIVATE—FREEHOLD BRICK EARTH, 30ft. deep, superior quality, adjoining Railway Station. Half will make best Reds, the other White Glazed Bricks; Splendid Investment. Samples and all particulars, "Money," 23, Sotheby Road, Highbury Park, London, N.

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EXCEPTIONAL CHANCE FOR SMALL CAPITALIST.—Bed of Clay, about 1½ acres, in rising neighbourhood, two or three miles from Bristol; Complete Modern Semi-dry Press Brick Plant and Steam Power on ground; site situated on main road and constituting a good building speculation.—Particulars, address "Clayworker," c/o Davies, Advertising Agent, Bristol.

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WANTED, a MURRAY'S BRICK MACHINE (No. 2); must be in first-class condition.—State full particulars and price to 35, Shakespeare Road, Acton, W.

MACHINERY, &c.—*Continued.*

WANTED, Murray's WIRE-CUT MACHINE. Send price and particulars.—J. Bellamy, Station Road, Whittlesea.

WANTED, POWER BRICK PRESS, Toggle Lever principle preferred; must be in good order.—Particulars and price to "Power," 43, Essex Street, W.C.

FOR SALE, PERFORATED CLAY GRINDING MILL, 9ft. diameter, Revolving Pan, Overdriven, Rollers 5ft., 16in. face, New; by Shepherd Hill & Co., Leeds.—Parker & Marney, 8, Savile Street, Sheffield.

FOR SALE, PLASTIC BRICK MACHINE, with or without Crushing Rolls, producing 20,000 Bricks daily; extra strong design; special features; references can be given.—For photos, prices, &c., apply J. Davis & Co., Chester Park, Kingswood, Bristol.

FOR SALE, Scholefield BRICKMAKING MACHINE and RE-PRESS; capacity, 11,000 daily; nearly new.—R. H. Longbotham & Co., Wakefield.

FOR SALE or HIRE, several large PORTABLE ENGINES, six to twenty horse; Wash Mill, Pug Mills, Chain Windlass, Crushing Mill, Brick Machine, Chain Pump, Centrifugal, Deep Well Pumps.—Address, Willsher, Forest Hill, S.E.

PAIR OF HORIZONTAL ENGINES, 16in. by 32in. stroke; Pair of Horizontal Engines, 18in. by 34in. stroke; Three Lancashire Boilers, 30in. by 7in. diam.; Perforated Clay Grinding Mill, 9ft. diam., new. All suitable for Brick Yards, &c. —Parker & Marney, 8, Savile Street, Sheffield.

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78 Horizontal Engines.
42 Vertical ditto.
20 Portables, Locomotives, and Traction Engines.
25 Boilers, Lancashire, and Cornish, &c.
40 Pumps, up to 30in. cylinders.
10 Mortar and Clay Mills.
Immense Stock of Tools and General Plant.

New Catalogue on request.

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Second-hand Clay-working Plant of all descriptions in Stock at Works, overhauled and re-fitted. Brick Machines up to any capacity. Hand Presses, Horse and Steam Power Pugs, Roller Grinding Mills, Cutting Tables, Engines, Etc., Etc.

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MACHINERY, &c.—*Continued.*

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FOR SALE, a superior massive 30in. by 48in. HORIZONTAL EXPANSIVE STEAM ENGINE, with heavy Fly Wheel and appliances; a grand engine for large brickworks

One 25 by 6ft. Horizontal Steam Engine, heavy fly wheel, &c.

One 16 by 30in. Horizontal Expansion Steam Engine, heavy fly wheel, &c.

One 12½ by 24in. Horizontal Tangy's Type Expansion Steam Engine, heavy fly wheel, &c.

One 8 by 18in. New Tangy's Type Expansion Steam Engine, turned fly wheel, &c.

One 18¾ by 20in. Massive Inverted High Speed Engine, 10ft. fly wheel, &c.

One 11 and 20in. by 24in. Compound Condensing Tandem Engine.
One 12½ ,, 22in. „ 26in. ,, ,, ,, ,,
Two 20 by 6 Lancashire Steam Boilers, all mountings, &c.
One 28 ,, 6ft. 6in. ,, ,, ,, ,,
One 18 ,, 6 Galloway ,, ,, ,,
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One 21 ,, 5ft. 8in. Cornish Boiler and 14½ by 30in. Stroke Horizontal Engine, Governors, Valves and Heavy Fly Wheel, all appliances as worked together.

For full Particulars & Prices address—J. Light, Wolverhampton.

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A Speciality. *The Largest Maker in the Kingdom.*

Also Maker of **Crowding, Off-Bearing, and Navvy Barrows, Strikes, Pallet Boards, Hack Boards, Sleepers and other Brickyard Requisites.**

Estimates given on receipt of specification.

Appended are three recent testimonials:—

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Dear Sir,—The 300 Hack Caps you have sent me are the best I ever had.
Yours truly, C. COOPER.

11, Heathfield Terrace, Plumstead Common,
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Dear Sir,—I received the Pallet Boards safe yesterday, but really forgot to write to you last night. I am very pleased with the wood for covers.
Yours truly, W. WARREN.

Beach Farm Road, Southsea, *February 7th, 1898.*
Dear Sir,—I have received the Hack Caps, and am pleased with them.
Yours truly, T. E. BASKETT.

For Sample Hack Cap forward 1/- in stamps

Write for Prices and Particulars to H. Blacknell, Postal Box and Hack Cap Manufacturer, Fleet, Hants.
Telegrams: "Blacknell, Fleet, Hants."

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FOR SALE, at the following low prices:—

Anti-Scum Paste, No. 1	30s.	per 40 gals.
Do. No. 2	35s.	,,
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Heavy Engine Oil	1s.	per gal.
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Tallow, English P.Y.C.	23s.	,,

Apply to the Tyne Oleine Co., Guildhall Chambers, Newcastle-on-Tyne.

SEND FOR CATALOGUE. INSPECTION INVITED.

THOS. W. WARD, Albion Works, Savile St.,

SHEFFIELD.

Telegraphic Address: "FORWARD, SHEFFIELD."

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PAIR EXCELLENT 21-INCH HORIZONTAL ENGINES, 48in. stroke, suited to work at high pressure. HAULING ENGINE, 16in. cylinder, 3ft. stroke, drum 5ft. diameter. 20-INCH HORIZONTAL ENGINE, 36in. stroke, bed 17ft. by 3ft. 12-H.P. COMPOUND PORTABLE ENGINE, 7in. and 12½in. cylinders, 12in. stroke, new firebox and tubes. 6, 7, and 8-H.P. PORTABLE ENGINES, fitted with new fireboxes and thoroughly overhauled. 2 LANCASHIRE BOILERS, 30ft. by 6ft., will insure for 70lbs. working pressure (insurance report). 2 LANCASHIRE BOILERS, 30ft. by 7ft., for 50lbs., with mechanical stokers. 4 STEEL CORNISH BOILERS, 30ft. by 7ft. with fittings for 70lbs. working pressure. 3-TON STEAM DERRICK CRANE, jib 47ft. long (by Dunlop, Bell and Co.), newly overhauled.

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48 PORTABLE ENGINES, from 2½ h.p. to 30 h.p.
29 MORTAR MILLS, CLAY AND OTHER MILLS.
19 SAW BENCHES, for various sizes circular saws.
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72 PUMPS, of various kinds and sizes, for land and marine purposes.
Depôt for "Worthington" Pumps.
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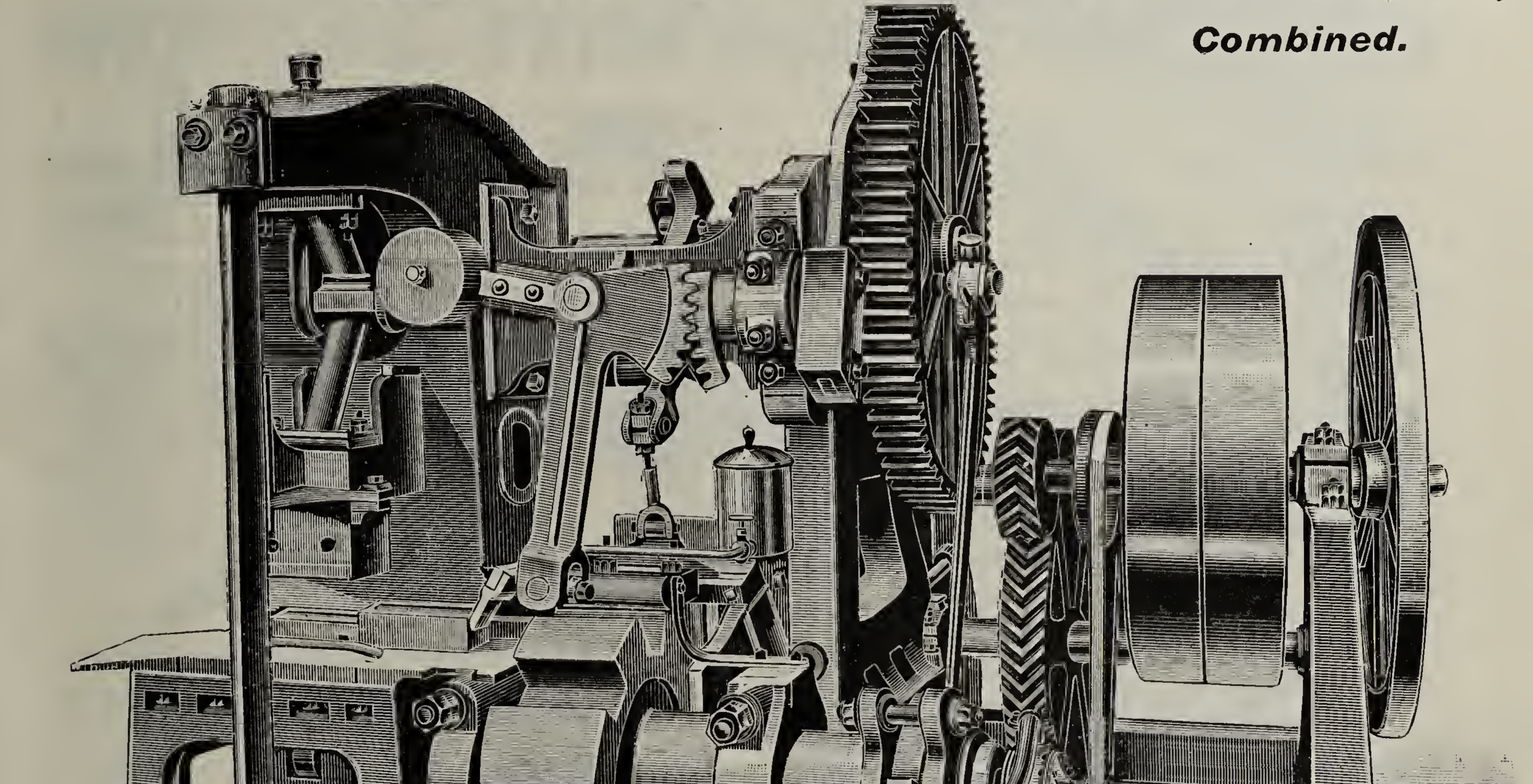

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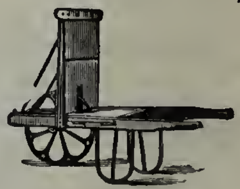

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THE BRITISH CLAYWORKER.

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Notes by F.R.I.B.A.

Bricks Blue, Blued, and Brindled.

The Manufacture of Majolica.

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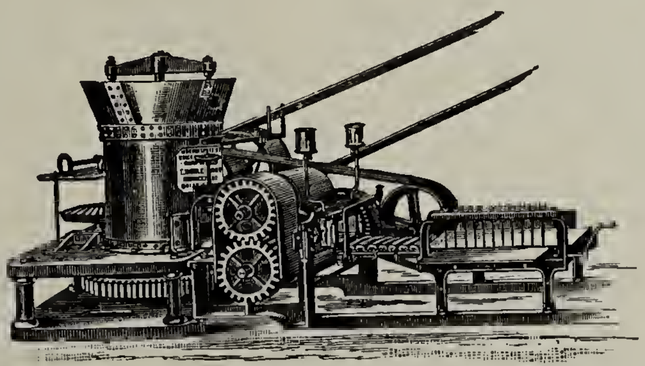

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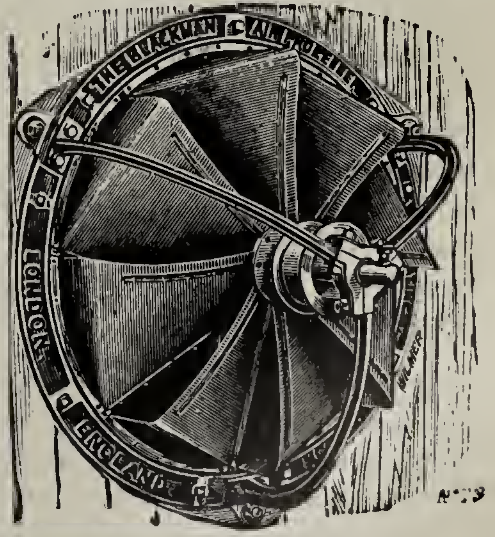

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BY THE WAY.

A correspondent of the *Times* has been giving some particulars as to brickmaking by the "submerged tenth" at General Booth's farm colony at Hadleigh. It appears that the "cost of kilns, sheds, &c., and initial expenses of opening up brickfields" stood on September 30, 1897, at £8,874; by September 30, 1898, the corresponding figure was £15,574. The stock in this section was returned at £2,705 in September, 1897, and at £3,974 a year later. These figures, however, include stock at the stores and in miscellaneous departments. The great manufacturing industry of the colony consists of brickmaking. In this department the stock rose from £1,720 to £2,747. The year's sale of bricks amounted to £4,717, against an expenditure of £5,563; but the latter item included the cost of replacing a large quantity of the roofs swept away from the drying-fields by the flood, and to meet this and other losses by the same disaster a grant of £885 was received from a special fund for the relief of Essex farmers.

* * *

The daily summer output now is about 50,000 bricks, including not only the yellow stock-brick, beloved by London builders, and the rougher article used for hidden interiors, but a fine smooth red brick for buildings of the highest class. Extensive additions are now in progress; fresh kilns on the most economical principle are rapidly rising; improved drying-rooms are being provided, where two days in any weather will do the work for which a fortnight of summer is now required; the latest machinery has been ordered, and would have been in operation long ago if the engineering trade of this country were not so inconveniently prosperous. When the new plant is all at work the two fields where artificial drying is employed will turn out 75,000 bricks a day, in addition to a yearly output of 4,000,000 from the summer field. London steadily demands all the colony can produce in the way of bricks; and they are sent up the river in barges which return laden with the house-refuse used to burn the clay, and with the chalk which gives the yellow bricks their colour.

This is very interesting and we should like to see the colony making a handsome income out of its brickmaking operations.

* * *

Our foreign Consuls send a lot of useful information concerning divers industries carried on within their sphere of influence, but we rarely hear anything from them on the brick industry. That is, no doubt, due to the circumstance that the majority of consuls know nothing about bricks, and they regard the industry as of such universal character that there is nothing to be said about it. The other day, we were talking to a consul, who frankly confessed that though he knew the brick industry to be a very large one in his district, yet he had never entered a yard, nor made any inquiries of the makers, because, he said, everyone knew how bricks were made, and there was not sufficient novelty in it to warrant his making a report on the subject. This only shows that the Foreign Office should employ more experts in certain industries, giving them roving commissions.

* * *

Among our near neighbours across the channel, in Belgium, has arisen a giant in our industry in the person of M. Dewit, Managing Director of the Compagnie Générale des Céramiques d'Architecture. This gentleman has come into prominence at a time when the brickmaking industry of Belgium was sorely in need of a master mind, to organise, exploit and improve the methods of manufacture. One finds antiquated methods and inferior products in almost all branches of the art, and the manufacturers who do not very promptly wake up to the state of affairs in their midst, are by way of receiving a severe awakening from the competition of the Modern Brickmaker.

* * *

M. Dewit served his apprenticeship in the best schools the country afforded, but having a scientific mind and a tireless energy he found poor satisfaction in the methods of his masters, and has now turned his abilities to a wholesale re-organisation of the industry. He has given much time to the study of the most advanced methods of manufacture in America, England and Germany, and with an incomparable power of organisation has set about the gigantic task. His first measure was the foundation in Brussels, as recently as August, 1898, of the parent company above mentioned, with a capital of a million francs. This company has for its object — manufacture, merchant business, and the foundation of subsidiary companies. A large brickyard, to turn out nearly half-a-million bricks weekly, is now installed close to Brussels, and is just about to commence manufacture. A vitrified paving tile and glazed brick factory is in course of erection at Hamois. A large store of the highest class ceramic products of English and other manufacture is to be seen in the company's handsome showrooms in the centre of Brussels. In June last the first subsidiary company was promoted, the "Briqueteries et Céramiques Liégeoises," and the capital was subscribed in the country three times over. At the same time the parent company's 100 franc shares were quoted on the Brussels' Bourse at 156.

* * *

Now we hear of a gigantic undertaking called the "Littoral Brick, Limited." This is being formed to establish three large factories in the neighbourhood of Ostend, each capable, when equipped, of turning out 33 millions of bricks per annum, and laid out with a view to doubling the output if demand arise. The towns in the neighbourhood of Ostend now consume over 100 millions of bricks of shockingly inferior quality per annum, but M. Dewit has, we believe, an eye not only to local demand but also to London consumption, for good bricks can be produced at less cost than in any English yard, and the freight across Channel is of course much less than it is on our railways from the large manufacturing centres. It is not our province to enter into the financial aspects or prospects of the scheme, but we may say as we go to press that the lists will probably be open in England as well as in Belgium, and we should not be surprised if some English gentlemen were found on the Board of Directors.

* * *

In order to produce a common brick of high quality and at a low cost, M. Dewit has adopted a combination of British methods of manufacture, drying and burning. In Belgium labour is very cheap, and the parent company undertakes to put the new concern in a position to turn out English-sized bricks at the marvellously low cost of 7 francs per 1,000. We are of opinion that even Peterboro' cannot do this, and the Ostend brick will, it is said, be a plastic-made, weather-resisting article of good colour. Well, we shall see. Though some in the trade may, perhaps, regard these proceedings with mixed feelings, we cannot but admire the spirit and energy with which the revolution of the Belgian brickmaking industry is being initiated.

THE BRICK-EARTHS OF GREAT BRITAIN.—XXVI.

Oundle District.

The centre of this district is some 12 miles, as the crow flies, from Peterborough, to the south west of that city. And although brickmakers are by no means wanting in the neighbourhood of Oundle, we venture to think that, in general, they are hardly aware of the different kinds of clayworking material within their grasp. From Peterborough across to Polebrook (see map, Fig. 1) there is a great expanse of Oxford Clay, but the district is poorly fed by convenient carriage. Such picturesque villages as Haddon, Morborne, Lutton, Denton and Hermington are in the heart of this well-favoured brick-clay district, and away to the south the "oak-tree clay" forms a broad expanse of undulating country, more than 100 square miles in area! There is enough excellent brick-clay here to supply the whole kingdom with bricks, though, as precisely the same observation applies to many other parts of the country, there is no occasion for jealousy on the part of our friends who do not happen to be located in the neighbourhood now under description. Of course, we know perfectly well that the owner of one yard in the Oxford Clay will be sure to declare that his neighbour does not possess such good clay; and if you go to the latter he will tell you the same of the clay in the former's yard. The fact is that with a thick marine clay such as this happens to be in this area, there is exceedingly little probability of the material varying over very many square miles. The basement parts of the formation, consisting of the Kellaways series, is naturally different from the upper and middle portions of the Oxford Clay. The Kellaways are sandy, with irregular sandstone bands and impure sandy clays. They differ from the Oxford Clay in regard to their origin, in that they were laid down in comparatively shallow water, whilst the Clay is of a deeper water origin. This will be better appreciated, perhaps, from a practical standpoint, when it is remembered that shallow water conditions such as obtained during the Kellaways period were near in-shore deposits, and all sorts of odd gritty and sandy mineral matter that happened to be available were utilised in its manufacture by Nature. The Oxford Clay, on the other hand, being laid down much farther out at sea, the great bulk of the heavier mineral particles were left behindhand, and a kind of differentiating action having been set up by off-shore currents, the resulting clay deposit is fairly pure.

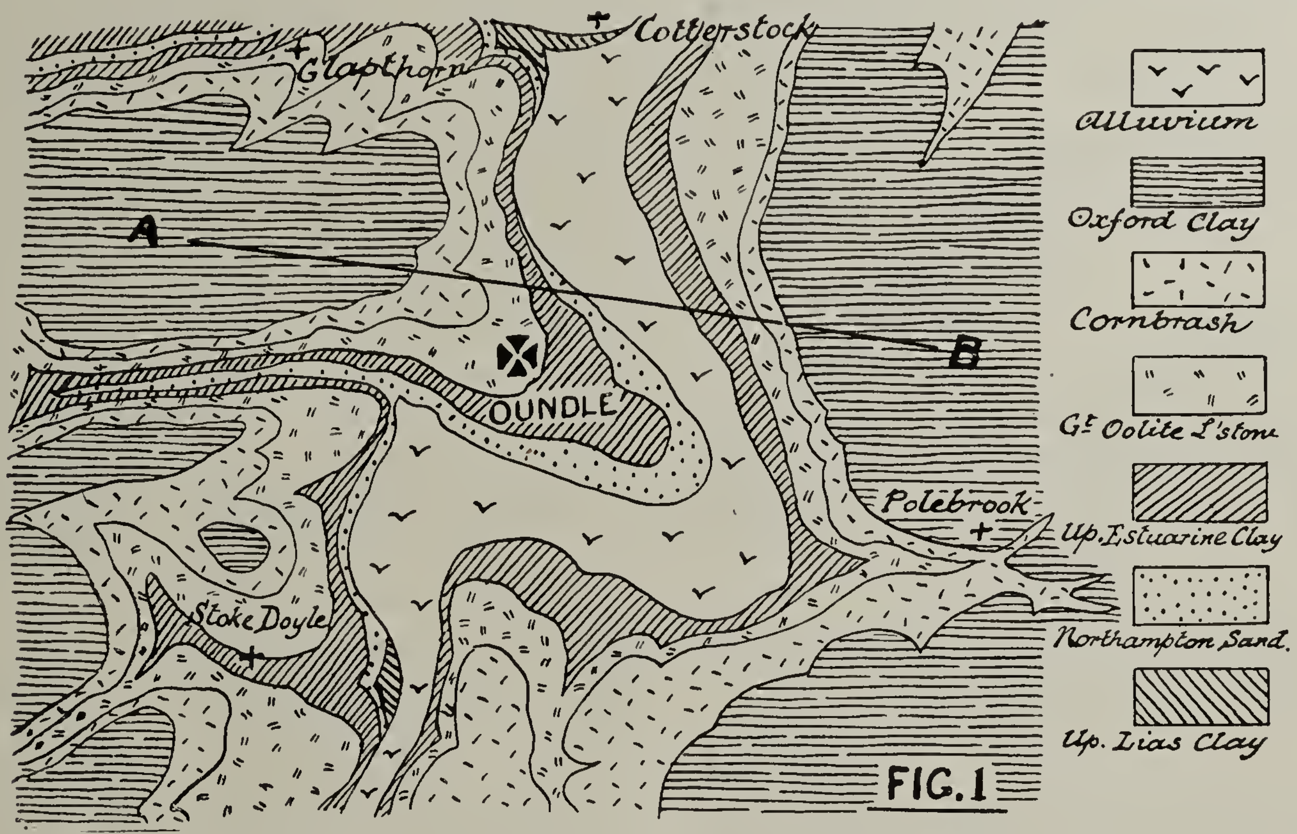

Fig. 1.—Sketch Map of the Brick-Earths and Limestones in the Oundle District.

Since the last issue of the *British Clayworker* appeared, the writer has received a letter from a firm expressing regret that the much-coveted Oxford Clay does not crop out on their recently purchased property (though not far from Peterborough). Our map (p. 132 *ante*) shewed them that fact. We hasten to assure the firm that from a brickmaking standpoint they have yet good clays near them. The precise locality has not been given to us beyond the mention of the name of the village near which the property is situated, and as they say they have abundant clay, they must have either the Upper Estuarine Clay, or the Upper Lias Clay, and the Great Oolite Clay is not far off. All these clays are well suited for brickmaking.

The Oundle district is a very fascinating one, there being such a great choice of good clay-working materials within a few square miles. A glance at the sketch map (Fig. 1) will show this. We do not intend to describe the clays in any detail—as, what we said in the last article respecting the same formations, will do for this. The Upper Estuarine clay skirts the bank of the river on the eastern side, and is found on the slightly higher ground on the western. Convenient railway carriage runs right through the centre of the district, and there is an easy gradient down to the line from either side of the valley. The Kellaways beds are dug for brickmaking, near Oundle, and yield a superior quality brick, which might be regarded as a semi-firebrick. Professor Judd observes that at Oundle brickyard the lowest beds of the Middle Oolite, consisting of light-coloured, somewhat sandy clay, with bands of hard, sandy and ferruginous rock, were well seen. The bands of sand-rock, which alternate with the clays, are seldom more than seven or eight inches in thickness, and often thin out altogether within very short distances. They are often so crowded with fossils as to lead that former geological surveyor to remark that the abundance of carbonate of lime did great injury to the bricks during their burning. At the present time, however, there is great improvement in that respect, as the makers have ascertained the way to get the best results. The clay here is said to form a brick capable of withstanding a considerable degree of heat. Some years ago when the clay was sunk through, ferruginous beds were met with, from which chalybeate springs arose.

The Upper Lias beds here consist entirely of clay, mostly of a shaly character, and somewhat ferruginous at the top. They only crop out in the north of our area at Cotterstock, and again to the south of Oundle, near Stoke Doyle, and bordering the river. This clay, which is of great thickness, is one of the best brick-making earths in the district.

Referring to the section (Fig. 2); that practically explains itself, and shows that the Lias Clay underlies the whole area, but at too great a depth, except in the two limited areas mentioned, to make it profitable to be worked. On the other hand, the Oxford Clay is seen to be well developed on the higher ground on both sides of the valley. The Alluvium here is also suitable for making bricks, but is much more variable in character than the thicker clays of the "solid" rocks alluded to.

Uppingham District.

The town of Uppingham stands on an outlier of the Northampton Sand. This outlier is of a very irregular character, throwing arms out on to the Lias Clay to the eastward, and supporting a capping of Lincolnshire Oolite near the village of Seaton. The junction of this sand with the Upper Lias Clay is ferruginous, and brickyards opened up along the line of junction will always present a readily fusible earth at that point, in contradistinction to the fatter and purer clays below. The old Uppingham brickyard is opened in the highest beds of the series, and yields an excellent earth as do some other yards in the Lias in the vicinity. The same part of the formation is also exploited in the brickyards at Seaton. Practically the whole of the Upper Lias in the areas represented on the map (Fig. 3) yields a satisfactory brick-earth, the chief variations being the substitution of shaly beds for the stiffer clays, and the occasional occurrence of small patches of calcareous clays locally. Mr. H. B. Woodward remarks* that a trial boring at Uppingham, made in 1876, commenced near the top of the Upper Lias, was carried to a depth of 400 feet, mainly in clay, with only thin stone-beds here and there—which gives us a good idea of the abundance of this material in that part of Rutland. The brickyard at Pilton (see Fig. 3) exhibited about 12 feet of blue clay overlaid by 6 feet of brown clay. Ferruginous nodules and septaria occur, and iron pyrites and large crystals of selenite (hydrous sulphate of lime) abound.

On the west of our map (Fig 3), the beds of the Middle Lias are brought to the surface in the deeper valleys, as near Wardley, Belton and at Allexton, Stockerston, Horninghold and Blaston. In the district under consideration the Middle Lias consists of an upper ferruginous lime-

FIG.2.

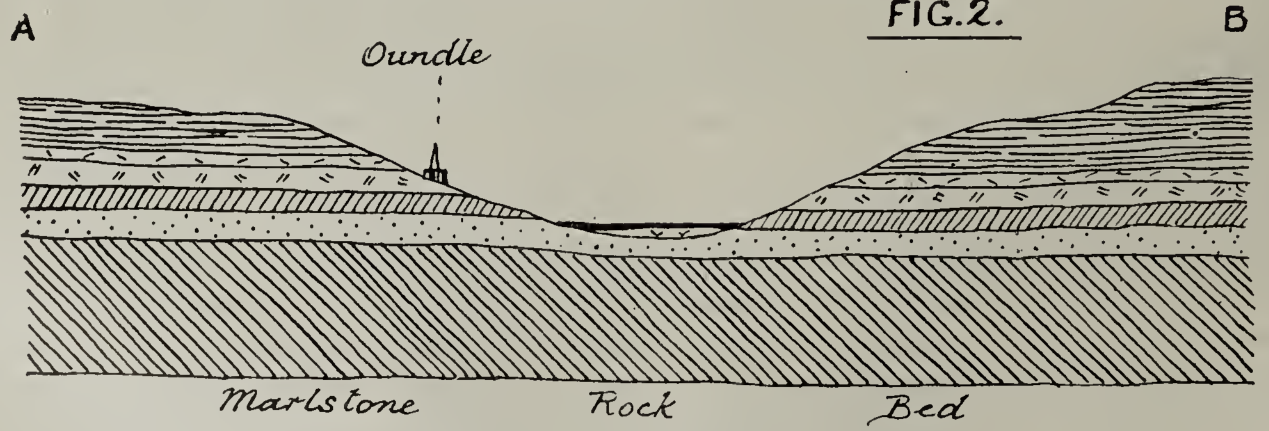

Fig. 2.—Section along the Line A B in Fig. 1.
(The symbols indicating the different geological horizons are the same in both figures.)

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*"Jurassic Rocks of Britain," Vol III., 1893, p. 236.

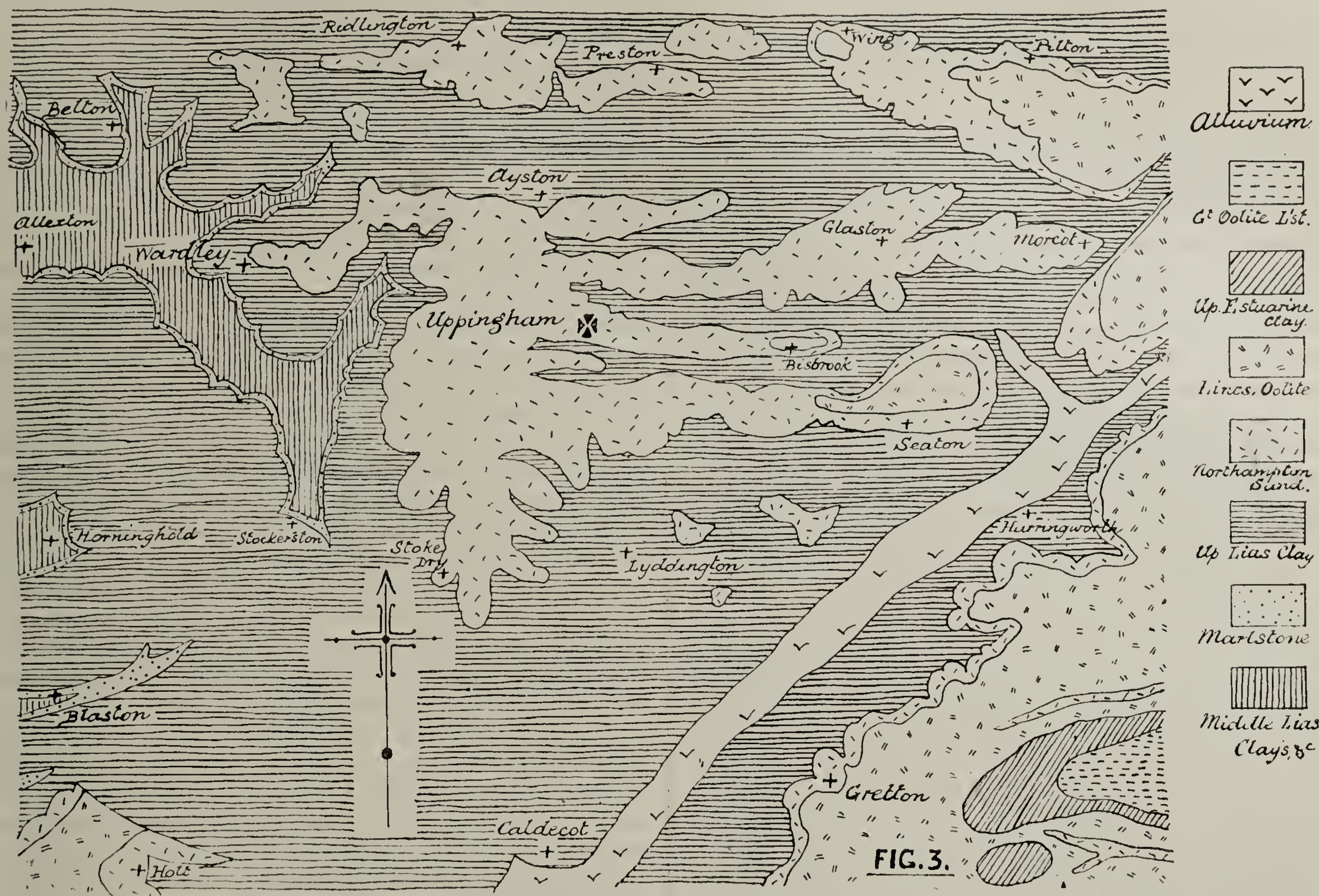

FIG. 3.

Fig. 3.—Sketch map shewing the distribution of Brick-earths in the Uppingham district.

stone, known as "Rock-bed," and a lower series of sandy and micaceous clays and ironstones with some beds of sand. The whole is known under the misleading title of Marlstone, though in our map (Fig. 3) we have, as usual, followed the mapping of the Geological Survey, and named the rock-bed division "Marlstone," as distinguished from the lower argillaceous portion of the Middle Lias which is also separately shewn.

Entering more into detail, we may give some particulars as to the smaller sub-divisions of the Middle Lias. Prof. Judd* recognises five distinct beds, as follows:—

1. "Rock-bed," already described.
2. Light blue clays, with bands of ironstone balls of concentric structure. Near Horninghold (see map) they contain beds of green and brown sand.
3. Beds of blue clay with septaria, the latter not unfrequently containing specular iron, and weathering to a red colour. These are well exposed in the brickyards at Belton (see map).
4. Beds of blue, highly micaceous clay, with large septaria.
5. Soft, yellowish brown, sandy and micaceous ironstone, crowded with casts of fossil shells, and alternating with light blue clays. These ferruginous bands vary very greatly in number and thickness, and are sometimes nodular.

The rock-bed is very variable both in thickness and mineralogical character; it is finely developed in the neighbourhood of Somerby (near Oakham), but in the area comprised within our map (Fig. 3), it has so far thinned out as to be only 2½ feet in thickness at Allexton, and 2 feet at Horninghold. In addition to the attenuation in this district, the bed sometimes loses its calcareous character, and becomes sandy, closely resembling some other members of the Marlstone.

It will be gathered from what we have already stated that the lower members of the Middle Lias are better for brickmaking than the other divisions of that series. At the same time, the sandy, micaceous nature of the clays, and the irregular composition of these latter render them far less valuable as brick-earths than the Upper Lias beds above.

Death of a Reading Brickmaker.—We regret to announce the death of Mr. John Wheeler, which occurred recently after a very brief illness. Mr. Wheeler was senior partner in the firm of Wheeler Brothers, Brickmakers and Builders, and had resided in Reading all his life. He was 76 years of age, and was greatly respected by his workpeople and fellow townsmen.

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* "Geology of Rutland," 1875, p. 64.

SOME ESSENTIALS OF SUCCESSFUL POTTERY WORKING.—I.

There are not a few prominent Clayworkers who hold that good and economical burning, forms the bed-rock, so to speak, upon which the successful working of a pottery stands. Others pin their faith to care and watchfulness generally in the selection of their materials ; with particular regard to the blending, mixing and preparation of the same ; holding that the real foundations of a clay-working establishment lie in the cellar or mixing room. Then again, there are clayworkers—happily in the minority—who concentrate all their energies on certain intermediate stages ; notably, in the actual making or fabrication of the wares. The materials and their preparation, together with the ultimate burning of the finished wares, receive, practically, no consideration at their hands, as compared with mechanical perfection in making, associated with a large, cheap, and rapid output : desirable qualities in every way, but not good enough, in themselves, to carry the clayworker through.

The position taken up by clayworkers, with regard to certain essentials necessary for the successful working of a pottery, is commonly influenced by, at least, two considerations : the nature and properties of the material used on the one hand, and the class of wares manufactured on the other. In the former case, a given clay may prove troublesome under one, or more, of the before-mentioned conditions, or it may give no trouble at all. As regards the second consideration, the qualifications for the manufactured goods may be of a nature demanding the closest attention, at certain specific stages, at the clayworker's hands ; or, and as not infrequently happens, the manufactured wares being common and cheap, the wares are sent out with no particular regard to style or finish, or to the working properties of the finished goods. This is generally seen whenever new clays, processes, or wares are opened up by the clayworker ; involving changes and new methods and principles of working.

First as to the material and its manipulation as distinct from the actual making or manufacture. There are few materials so diversified, not to say dissimilar, in chemical composition and physical structure, as those which are classed as clays. And similarly, there are few materials of greater age, that have been, and are, more generally used in the arts and manufactures, the world over, than are clay wares. They run up from the common brick, through all grades, to the best productions in terra cotta. Some of the more important utensils of the house, together with those of the factory, chemical works, and foundries, are made in clay. Clay wares are met with in every electrical plant, in the way of conduits and insulators ; while for drainage, and for general purposes of sanitation, the material stands alone. However, it is this dissimilarity in clays, one from another, which renders their use possible in so wide a field, and for the many purposes for which they are employed. But this dissimilarity, since it became evident from the preparation of the material, through all stages, to the final burning of the wares, and to the ultimate wearing properties of the same, is a source of trouble to the clayworker. Indeed, the past history of the clay-working industry is repeated in the practice of to-day : one prolonged struggle on the part of the clayworker to overcome, develop, or adapt, the material at hand for the work.

The raw material may be obtained on, or in the near neighbourhood of the works : working conditions for the most part observed in connection with potting in its simplest form—that is in the manufacture of some one particular class of wares. As a pottery becomes more general in character, clays are commonly obtained further a-field ; because of increased complexity in the business. The same thing may occur in bringing the manufacture of a given class of wares up to the highest state of perfection in its own particular sphere ; clays may be imported irrespective of distance or cost, provided always they are essential to the work. Indeed, some of the largest clay-working establishments of the country have to depend, almost entirely, on outside connections for their raw materials ; and, for that matter, prepared materials also.

It is obvious that much depends on a wise selection, and on the correct blending of one's clays. Taking clay waies as a whole there are qualities in general and qualities in particular. A tough, hard, non-absorbent body ; free from cracks or distortion, uniform in colour and composition, having a grain as fine, and as regular in size, as the nature of the manufactured wares will allow, together with a low shrinkage, may be looked upon as essential qualities, in general, for high grade wares. As regards qualities in particular, they are usually associated with wares for specific purposes : for electrical, chemical, or metallurgical work, and sometimes for the purposes of art ; such wares may require additional qualifications in the way of greater accuracy, a more vitreous or closer body—more or less acid or basic in character—the ability to withstand sudden changes of temperature without fracture, or the permanence of the colour on the one hand, or its total or partial suppression on the other ; each and all would determine particular qualities, as opposed to the more general properties, previously mentioned, of the finished wares.

Knowing the percentage composition of a given body, of established reputation and proved worth, as used in the arts and manufactures of the country—from a brick or sewer pipe to the more complex productions of the clayworker's art—it should not, theoretically, be a difficult matter for the clayworker to reproduce its kind. In any case, provided suitable materials of known composition are used, and are blended in such proportions as shall give the same percentage composition, as that of the body in successful use, the clayworker can hardly go wrong, even should the resulting body just fail to reach the standard of excellence attained by the original. For instance, a mixture of three materials, A B and C, in right proportions, could be made to give a body having the same chemical composition as that obtained by the use of two : D and E, though each of the five materials, in so far as their percentage composition is concerned, may be widely apart. However, there are certain physical considerations to be taken into account ; hence the method, in spite of its many successful applications at the hands of enterprising and up-to-date clayworkers, does not always give the results expected. If the resulting product were glass, instead of a stone or earthenware body, the general application of the principle would be comparatively easy. Some state of solution is at all times necessary to ensure complete and intimate mixture of the particles comprising the mass. The solution may be affected by water, or other solvent, or by the application of heat, more or less intense, in accordance with the nature and properties of the materials. Theoretically, the finest body is that wherein the identity of the constituents is absorbed or lost in the whole. The qualities or properties of a perfect body should be an expression of the sum total of those of its constituents of which it is composed. This is, unfortunately, not attainable in clay-wares. It is only in cases where the use of materials in a very fine state of division is possible that anything like a near approximation to the foregoing conditions may be attained.

The chemical composition and physical properties of a given particle of clay after it has passed the mesh of a thirty-sieve—sufficiently fine for most purposes in the clay-working industry—are the same as those of the fifty-pound ball of which it may have formed a part. However, the finer the particles, the least likely are they to exert any disturbing influence on the mass. Loss in size or bulk means loss in strength ; that is, not internally, as affecting constitution and structure, but externally, as affecting outside relations between particles dissimilar in kind. This question has been treated at some length because the foregoing principle, though useful and deservedly popular, is useless in the hands of the inexperienced ; in short, it has not realised, in practice, all that has been claimed, by certain enthusiasts, on its behalf. One example will make this clear.

A body is required that will take the salt ; that will compare favourably with the best productions in salt-glazed stoneware pottery. The clays on a given works are aluminous in character ; open and dry, partaking of the nature of fire-clays : clays of the coal measures. Such clays will not take a good salt glaze, for which a large proportion of silica is necessary : some 75 per cent. silica to something just over 20 per cent. alumina. Now it is possible to add sand, &c., to these fire-clays, in such proportions as shall give a body which, on analysis, will yield figures practically the same as those obtained from a standard body—admittedly the best for the work. Yet these two bodies will yield widely different wares on burning ; all conditions being equal, including the chemical composition. It is not possible to introduce into coarse, open, fire-clays, the silica and the small quantity of alkalies and iron necessary for high grade salt-glazed stoneware, in so fine a state of division, and so thoroughly and completly diffused throughout the mass withal, as occurs, naturally, in the clays that are used for the work : notably, the better class of the Devon and Dorsetshire clays. Take a piece of clay containing, say, 4 per cent. of alkalies, burn it, and note the vitreous fracture. Take another clay, free from alkalies, add 9 or 10 per cent. of pure felspar in the finest state of division, that of flour, well mix and burn, then note the result at the fracture. There is no complete diffusion of alkali throughout the mass, no regular vitreous fracture, though the alkali present in each, together with all other conditions, might be equal.

The Paris Exhibition Boycott.—Owing to the Dreyfus scandal, the first British firm to withdraw its exhibit from the Exhibition is the Abernant Dinas Silica Brick Co., of South Wales.

Proposed Cement Works at Barrow.—We hear that a further new industry for Barrow is about to be introduced. Already land has been pegged off for the proposed works in the vicinity of the old iron furnaces in Ainslie Street and the immense slag bank there. The object of the promoters of the new industry is to manufacture cement, slag-paving, &c., and to develop other similar business. It is anticipated that there will be found a good opening for the new firm's operations in this district, and that at an early date the concern will be in full operation.

WIRE-CUT BRICKS WITH FROGS.

To the Editor of "The British Clayworker."

Dear Sir,—Will you allow me space in your next month's issue to shortly refer to Mr. Simpson's letter in your last issue.

I do not think I should be doing much service to the subject, or to the advancement of brick-making, by making any lengthened reference to Mr. Simpson's belief as to the value of my patent right, since my right—if contested, must be left to the decision of those whose province it is to decide such matters.

I do not think that I should be serving any useful purpose by criticising the example and illustrations given in Mr. Simpson's letter, but it is, however, interesting to observe how very clearly they demonstrate the necessity for an instrument which shall satisfactorily, economically, and expeditiously, effect the frogging of wire-cut bricks.

I have now had a sufficient experience of the working of my invention, to enable me to speak confidently as to its merits.

The bricks are set out on the hacks in the ordinary way as are hand-made bricks ; they stand about two days, when they are fit to be scintled. The hack is six-course high, and the man or boy with the patent instrument cuts each brick, and then scintles it. My man, with this instrument, can cut and scintle 1,200 bricks in an hour. Each brick is clean cut, and not one of them cut through the ends, and I am having 50,000 or 60,000 done every week. With regard to the cost, it may be seen at a glance that this is very trifling. If the bricks were not frogged, they must necessarily be scintled, and the dual operation in point of time does not entail a much more lengthy proceeding. The clay removed is not wasted, but can be used again—while, for carriage, the frogged brick is lighter.

I will only add that it will give me great pleasure to show anyone, at the Shenfield and Hutton Brickworks, on their making an appointment, the process I have shortly described in course of operation ; and it will then be seen that the invention is a complete success, and possesses the advantage which I claim for it.

I am, dear Sir,
Yours faithfully,
Daniel Cornish.

Shenfield and Hutton Brickworks,
Essex.
29th August, 1899.

To the Editor of "The British Clayworker."

Dear Sir,—*Apropos* of Mr. Simpson's letter as to "wire-cut bricks with frogs," it may be of interest to your readers to know that about 30 years ago, at Chatham, a test was made under the direction of Mr. Bernays, the engineer in charge of the Dockyard Extension Works, to decide whether a wall built of ordinary wire-cut bricks *without* frogs was as strong as if built with bricks *with a frog*, and the result proved that the former wall withstood the greater pressure.

I am fully aware that this result is contrary to the general idea in the trade, for I have several times had the remark made to me by brickmakers that they could not sell ordinary wire-cut bricks in some districts, owing to the absence of the frog, which was insisted upon by builders, with the idea that it formed a "key."

It has always been my contention that the rough (or wire-cut) sides of an ordinary machine-made brick form a far better key than any frog, however deep it may be—and, at the same time, a saving of fully 20 per cent. of the mortar is effected.

On the other hand, if a "key" were actually formed by means of the frog, it would be necessary to have the frog on both sides of the brick, and this is hardly ever seen—in fact, never, in the case of hand-made bricks.

I should like to hear other people's views on this subject, as it is a question of great interest to engineers, brickmakers, and builders alike.

Yours faithfully,
Sidney G. W. Hunter.
Murray's Brick-Machine Works,
Southwark, S.E.
August 24th, 1899.

Accident at Crowborough.—Last week a workman, whilst feeding clay into the machine, got entangled in the same, breaking his leg, and otherwise seriously injuring him.

Fire at a Tonbridge Brickworks.—The works of the Quarry Hill Brick Company at Tonbridge were destroyed by fire on Monday last. The outbreak occurred at five o'clock, and the flames spread with such rapidity, owing to the materials of which the buildings are composed, that in an hour the whole of them, together with the engines and machinery, were destroyed. The local fire brigade were in attendance, but their efforts were of little or no avail, mainly owing to a lack of water. A large number of men are thrown out of employment, and the damage amounts to several thousands of pounds.

Death of a Scotch Brickmaker.—We deeply regret to announce the death of an old friend of *The British Clayworker*, Mr. William Gilmour, managing partner of the Pitfour Brick and Tile Company, which occurred at Hawkstone House, Glencarse, on September 5th. Deceased was born at Galston in 1837, and started business with his father in Galston Brickworks. At an early age he left there for British Guiana, where he was employed as manager in a store. About 1857 he returned to Galston, and after being there for a year he went to Glamis as manager of the Glamis Brick Works. In 1871 he came to Glencarse as manager to Mr. Robert Small, who was then proprietor of the brickworks. About nine years ago the firm was formed into a Company, with Mr. Gilmour as managing partner. While acting in this capacity the works have undergone extensive alterations, and only recently they were fitted up with new plant. The deceased, who was a Liberal Unionist, was Chairman of St. Madoes Parish Council, and a member of St. Madoes School Board. Mr. Gilmour was 62 years of age, and leaves a widow, three sons, and four daughters.

Leaving Work without Notice.—At the Cwmbran Petty Sessions the magistrates had before them the case of three brickmakers employed by the Cwmbran Brick Company, who struck work without giving a week's notice. The men were employed as fillers of clay. As a consequence of their absenting themselves the works, which employ 40 men and boys, were stopped for three days, and the company claimed 40s. from each as damages, but really, according to the managing director (Mr. George Williams), they lost £10 or £12. The defendants received 5d. per hour, and were paid weekly, the wages amounting to 23s. 6d., and they left after making two applications for an increase of wages, which were both declined. The rule of the works was a week's notice, and the men had been employed there two years. William Clark, the foreman, said he reminded the men that they were expected to give a week's notice, but that they said they had finished and now declared that the custom of the district was to work by the hour. The magistrates decided that the men must pay the 40s. each which the company claimed, and the Court costs, 5s. 6d. each; in default of a distress, 14 days' imprisonment.

WORKMEN'S COMPENSATION ACT AND THE INSURANCE COMPANIES.

Rate Cutting—"A sure way to Destruction."

We have upon more than one occasion been accused of arrogance in claiming that the British Clayworkers' Mutual Insurance Corporation can give the lowest quotation in the market. It has been useless for us to attempt to explain, that because other Companies offered a rate lower than our own, that was no criterion as to what constituted a "low" price. There was never any disguising the fact that our "Mutual" concern could not and would not quote rates in competition with other offices. All we have tried to do is to warn insurers against accepting ridiculous prices which were quoted only to keep us from doing legitimate business, and with the hope of our speedy extinction, and the removal of a stumbling block to a reversion to high rates. Certain brickmakers, who last year implored us to save them from extortionate rates, have been only too ready to throw us over this year because they have saved a few shillings by joining the forces that are now arrayed so strongly against us. Shame upon them! And they have been kind enough to venture the opinion that this journal has been persistently raising the bugbear of low rates, because it is afraid of losing business for the Corporation. One very candid firm went so far as to assert that it thought a 2/6 rate was ample! Perhaps that firm, and other timid and ungrateful clayworkers—of which, to the everlasting credit of the trade, let it be said there are very few—will find some consolation in reading an opinion other than our own, concerning this question of low rates. The article is taken from the *Financial Times*, a journal which can hardly be accused of self-interest.

THE OCEAN ACCIDENT AND GUARANTEE CORPORATION AND WORKMEN'S COMPENSATION BUSINESS.

We are greatly disappointed at the action of the Ocean Accident Company in the matter of Employers' Liability Assurance under the New Act. At the annual meeting the Chairman spoke so wisely about the miserable folly of seeking to under-cut rates of premium until some experience of the actual risks had been gained, that we gave him a special paragraph of commendation. To our surprise we now find that the speech was merely a belated echo of the immortal Mr. Pecksniff saying, "Let us be moral, my friends." The office has gone headlong into the abyss which its own admiral described as a sure way to destruction. The Ocean has tremendous responsibilities all over the world, including, we believe, a great liability for insurance of commercial credit here and in America, and however strong and energetically managed it may be, it has need to walk warily. IT WILL HARDLY BE CREDITED, THEREFORE, THAT IT SO SEEKS TO GRASP THE WHOLE BUSINESS UNDER THE NEW ACT, AND THAT RATES, EVEN FOR THE MOST DANGEROUS TRADES, ARE QUOTED AT LESS THAN HALF OF WHAT THE CALMER COMPANIES JUDGE TO BE NEEDFUL. Not only so, but in some cases the rates quoted are actually less than were charged for the very small joint risk under the old Act. A glance at recent balance sheets of Companies doing Employers' Liability business shows clearly that there can be no margin wide enough for hazardous experiments in reduced rates, and that business so taken can hardly fail to end in serious loss. The intention may be to get hold of a great mass of business for a single year and then to cancel the bad and raise the rates of the balance when actual results are seen; but such a scheme would not greatly differ from that of the peddling shopkeeper who attracts customers by selling sugar at a farthing under cost, so that he may charge them an extra sixpence on their tea.

WE WOULD AGAIN SERIOUSLY URGE EMPLOYERS NOT TO BE LED ASTRAY BY ANY COMPANY, LARGE OR SMALL, OFFERING TO DO BUSINESS AT A PHENOMENAL REDUCTION BELOW THE PREMIUMS CHARGED ELSEWHERE. A very simple accident may land a master in a liability of £52 a year for a possible forty or fifty years, and it should be kept in mind that this liability (unless compounded for) continues against the master, and not against the Insurance Company, who have no direct contract with the injured man. Consideration of this fact, and of the other one that the liberal compensation puts an actual premium on "intentional accidents," shows HOW NECESSARY IT IS TO SELECT AN OFFICE WHICH IS NOT ONLY STRONG IN THE MEANTIME, BUT WHICH SO ACTS AS TO GIVE CONFIDENCE IN ITS FUTURE, AND SELLING INSURANCE AT LESS THAN IT IS GENERALLY BELIEVED TO COST IS HARDLY THE WAY TO INSPIRE THIS CONFIDENCE. We hold no brief for the tariff companies or any others. Competition there is in the matter of rates, and we do not for a moment suggest that there may not be room for a reduction in the figures first quoted, but there is "reason in the roasting of eggs," and only a careful course is the safe one. We believe that the "Ocean" has gone further than is safe; because it is the largest Office it is the most likely to do harm by its example, and we think it well to make the position clear.

Bricks—the Earliest Mark of Civilization.—What is asserted to be the oldest brick in existence was recently exhibited at a meeting of the Académie des Inscriptions et Belles-Lettres, of Paris, by M. Henzey, the keeper of the Louvre. It is supposed to date from the fortieth century before Christ, and was discovered at Tello, the ancient Sirpulo, in Chaldea, by the French archæologist, De Sarzee. The brick in question was curved in shape, and, while it had been baked, it did not show any signs of having been pressed or moulded. The mark of the maker was merely the impress of his thumb, and the specimen is, without doubt, one of the earliest marks of civilization ever discovered. As brickmaking is the earliest of the known arts, this particular piece must mark very nearly the dawn of civilization.

A CONTINUOUS REGENERATIVE GAS KILN.—I.

MR. JAMES DUNNACHIE, managing director of the Glenboig Union Fireclay Company, as far back as the year 1881-82, devised and brought into practical operation a Continuous Regenerative Gas Kiln.

So far as kilns are concerned, this was the first successful attempt to combine the advantages to be gained by the use of gaseous fuel, with the regeneration of the air used for combustion, by means of the waste heat of the burned-off kilns. The principle of the regenerative furnace was first recognised by Robert Stirling, a Scotch clergyman, father of Patrick Stirling, the well-known loco. superintendent and engineer of the Great Northern Railway, who died a few years ago. Robert Stirling was the real originator, or inventor, of the regenerative furnace, and it dates back to the year 1816. After Stirling came Erricson in 1833; Gorman (in 1852), a lithographer and inventor, who flourished in Glasgow, and Frederick Siemens in 1856. Also before the date referred to, kilns on the continuous principle, and using solid fuel, had been in use for the burning of common red building bricks; but the temperatures of such kilns were far too low for the burning of refractory firebricks, and it was the desire to meet that want that led to the construction of the Continuous Regenerative Gas Kiln for the higher temperatures required in burning firebricks, pottery, etc.

In the year 1881-82 the new basic steel process of Messrs. Thomas and Gilchrist was exciting a great amount of attention, and Mr. James Dunnachie, Glenboig, having been appointed the sole maker of the basic bricks for Scotland, found that the cost of burning them in the ordinary way was so high, that he at once erected a set of regenerative gas kilns, which satisfactorily settled the question of the practicability of gas firing—a point on which doubts had been raised when he first completed his plans, and laid them before one of the first authorities in England, who alleged that he had himself tried to solve the problem, but without success. The Glenboig Company, after a dozen or fifteen years had elapsed, are using the kilns exactly as they were at first built, except that they had added Mr. Dunnachie's recently patented system—a preliminary "steaming" before full firing is begun.

This system of "steaming" is applied with equal success to the "Continuous Regenerative Gas Kiln," and also to the more recently patented "Composite Regenerative Gas Kiln." Both the "Continuous" and the "Composite" arrangements may be seen in practical operation at the Glenboig Works, as also in England and in the United States.

In the Glenboig district there is an almost inexhaustible deposit of fireclay in the strata, which belongs—speaking geologically—to the millstone grit series of the Scottish coal measures. When properly selected and properly treated, the clay yields firebricks whose power of withstanding great furnace heats is something extraordinary. The bricks and other goods made from it have only been generally known for about the same period as is covered by the history of the Bessemer and Siemens processes of steel-making as practical inventions, but they are already in extensive demand in almost every country in the civilised world, and one of the works in the Glenboig district is, without doubt, the largest establishment of the kind in the United Kingdom.

The establishment in question—known as the "Glenboig Star Firebrick Works" is the one at which the new departure in kiln firing has been taken; and it is there that the success of the system has been made. It therefore comes to be exceedingly interesting to note that the bricks that are so extensively employed both at home and abroad in the construction of heat regenerative furnaces are henceforth to be fired by the same method, though modified to suit the special circumstances of the case.

Mr. Dunnachie would doubtless have gone on with the "Continuous" gas kiln long before the date of his patent, but he was waiting for a gas generator capable of providing him with an abundant supply of cheap gaseous fuel. Eventually there was brought under his notice the Wilson Gas Producer—an invention that is most closely identified with the Cleveland district, where innumerable improvements in the metallurgical and cognate arts have been initiated and practically worked out. The invention in question seemed to meet all the preconceived wants, more especially as regards the fact that it embraces an induced current arrangement of forcing the gas into and onward through the kiln. Two gas producers were ordered, and in due course they were erected at a suitable place within the works, and at the same time Mr. Dunnachie proceeded to erect a gas kiln embodying all the newest notions that seemed to accord with the most efficient method of developing the calorific powers contained in the gaseous fuel.

In its complete form the kiln consists of a series of ten separate chambers, all of the same size, and having a capacity for about 13,000 or 14,000 bricks, according to the size and shape. They are arranged in two sets of five, each set being contained in a mass of brickwork, with the requisite gas and air flues arranged underneath the floor of the kiln. The two masses of brickwork are placed parallel to each other at a distance of about 20ft. apart, and the space beween them is covered in by iron roofing, so that it is possible to carry on all the operations of charging and drawing, steaming and heating up, regenerating, firing, cooling down, &c., in any kind of weather. So far as the working of the kiln has gone it has been abundantly demonstrated that the system suits most admirably.

Let us assume that one of the chambers—say No. 1—has just been burned off, then the current of gas—for the gas produces at a temperature of from 600° to 800° Fahrenheit, and containing well-nigh 40 per cent. of combustible matter—is turned on to No. 2 chamber, and the stream of atmospheric air necessary for its combustion is made to pass through the mass of finished bricks in No. 1, which serves as a heat regenerator of extraordinary efficiency. At first that stream of air will be heated, doubtless up to well-nigh the melting point of steel. When the hot gas and the still hotter air become thoroughly mixed in the flues and escape through the burners into the kiln-chamber proper, there is produced a magnificent heating effect, such as is seldom seen apart from metallurgical operations conducted on a very large scale.

The burning operation is completed in a period ranging from thirty-six down to twenty-four hours, and when all the arrangements of the finished kiln are in full and regular daily work the time required for a burning operation may be materially reduced, whereas, in even the best type of coal-fired brick kiln not working on the heat regenerative principle, a firing operation requires from forty-eight to sixty hours, or from four to five twelve-hour shifts.

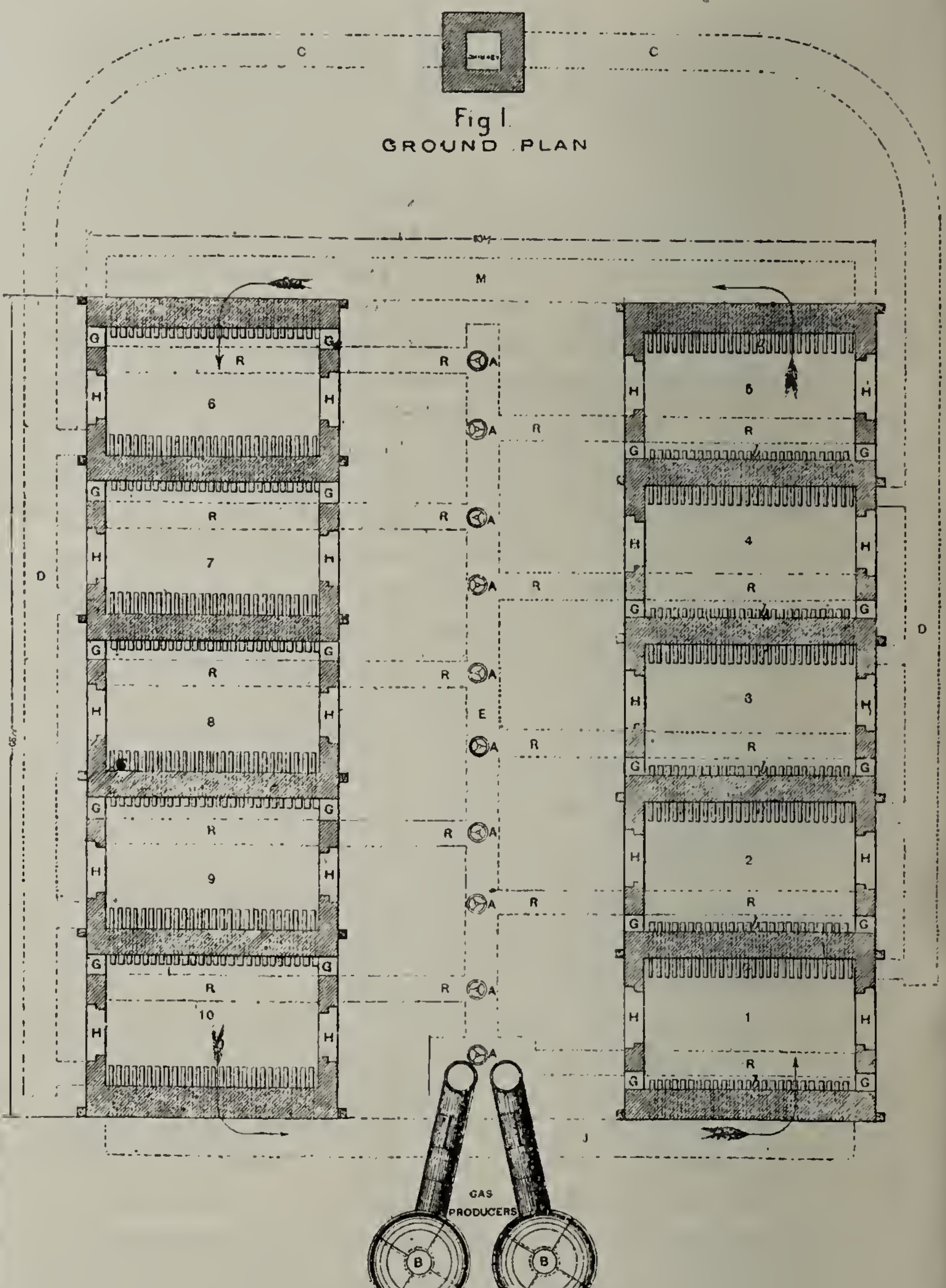
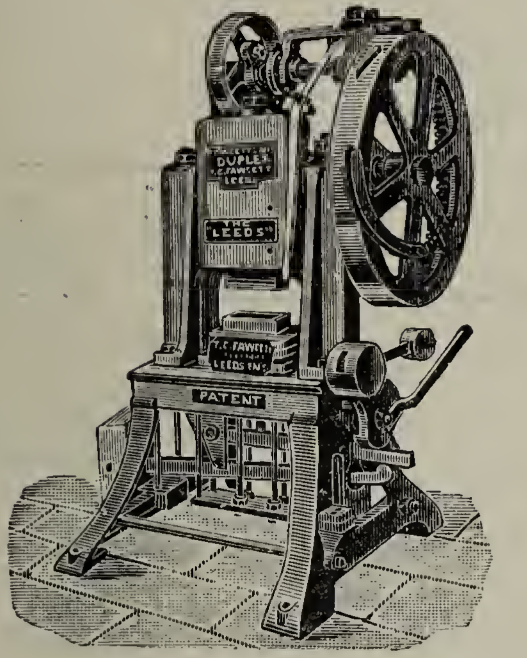


Fig I.
GROUND PLAN

But now another important point must be taken notice of—namely, the fact that, before the firing proper began in No. 2 kiln-chamber, the mass of brick contained in it was at a bright-red heat, that effect being due to the circumstance that the effluent gas from No. 1 chamber was passed through it, and was thus made to give up all the heat contained in it except such as was required to produce an ascensional current in the chimney stack. In this way a burned-off chamber of brick is always in readiness to serve as a heat-regenerator for the current of air requisite in the next chamber of this series. Valves and dampers are provided for keeping the currents of combustible gas, air, and effluent gas under the most powerful control, and the ultimate effect is, perhaps, even more beautiful and scientifically perfect than the original conception. Not only is there greater economy as to the time required for the firing operation in any kiln-chamber, attended with various other economies that need not at this point be enlarged upon, as they will readily suggest themselves to practical people; but there is a still greater economy in respect of the fuel employed. The amount of fuel found necessary to burn a brick, or a given quantity of bricks, has been reduced to fully fifty per cent., and there is good reason to believe that the saving in fuel has reached seventy-five per cent.

(To be continued.)



THE "LEEDS" BRICK PRESS

With Fawcett's Patent Stopping and Dead-weight Thicknessing Motion and Differential Pressure.

This Press is very largely used for pressing glazed bricks, which require to be all of exact equal thickness. It will press about 4,000 bricks per day with one boy to operate it, and will press them all of one exact equal thickness, although the quantity of clay may vary half-a-pound; this is done by the patent compensation arrangement of bottom moveable panel with levers and weights.

It is also suitable for pressing all kinds of plain and ornamental, red and glazed bricks, tiles, and terra-cotta work.

It is also fitted with my patent differential purchase gearing, for giving double purchase while pressing the brick, which is a very necessary and advantageous feature over other Presses.

The Machine is substantially built, and of the best materials; all bearings are bushed with best gun metal, and of extra large sizes. The pressure is obtained by our well-known patent toggle-motion levers, which are all of the best crucible steel; all the working parts can be seen while the machine is at work, and are easy of access for oiling, etc. It is very easily and quickly adjusted for different thicknesses of bricks. It is also fitted with automatic gear for stopping the pressing head at the top, after pressing the brick, and automatically lifting it out of the mould ready for taking away by hand instead of by the usual pushing arm; another brick is then put on, and by moving a small handle close to the operator, the machine starts and completes another cycle of operations.

THOS. C. FAWCETT, Ltd.,
Whitehouse Engineering Works, Hunslet Road, LEEDS.

Makers of Patent Semi-Dry and Plastic Machines, Steam and Hand Presses, Pug Mills, Solid and Perforated Bottom, Clay Grinding Pans, Clay Crushing Rollers, Clay Mixers, Sieves, Engines, Shafting, and

GENERAL BRICK & CEMENT MAKING PLANT

ILLUSTRATED CATALOGUES ON APPLICATION.

PERMANENCE IN COLOUR OF BRICK AND TERRA COTTA.

It has been frequently observed that red brick or terra cotta, after prolonged exposure to the air, undergoes many changes, particularly as regards colour. Speaking generally, five or six years' exposure will be found to have considerably modified the colour and appearance of most buildings where terra cotta has been largely used in construction. And, commonly, the deeper the original tint the more pronounced the change, and this apart from any considerations in the way of dirty surroundings: smoke, fume or dust-laden atmosphere. The change is, perhaps, not so noticeable where the terra cotta has been made to contribute to, but not to give, the complete outline or elevation of a building. However, the colour is never permanent. Though the conditions as to composition, making and burning be practically equal, taking the terra cotta as a whole, after exposure hardly two blocks of terra cotta will be found alike.

The properties of iron are well known; it is by far the cheapest and most effective colouring agent known in the clayworking industry. Under proper conditions its well known oxide: Fe_2O_3, gives, in effect, a deep and permanent red. However, the colour may be modified to no inconsiderable extent by the presence of lime, chalk, magnesia and certain soluble salts—chiefly sulphates—to say nothing of organic matter. The operation of burning, also, has its own colour effect on the wares: the red oxide of iron: Fe_2O_3, being particularly sensitive to reducing influences at relatively high temperatures.

Clays are frequently used in the fabrication of red brick and terra cotta, often in connection with large and important jobs, which do not contain the essential ferric oxide in due proportion for the work. Or, on the other hand, the presence of one or more of the before-mentioned oxides, carbonates, sulphates or carbonaceous matter will seriously affect the colour. The problem is to get such clays in the way of finished wares in line with the best known work. This may be in part accomplished by the addition of certain patented mediums, by the limited admission of air or oxygen in the burning or by means of a wash. By such and similar means low-grade clays are made to compare favourably with those of the highest quality; in so far as the colour is concerned. But there the matter ends; the effect will be but short lived.

Two qualities are absolutely essential to permanence of durability and colour, saturation and insolubility. Unsaturated compounds, those capable of further oxidation, existing in brick or terra cotta must ever be a source of weakness, and prevent the ultimate permanence of one's wares. A piece of red ware under proper conditions may be burned in many shades or tints and it will be more or less permanent in character. Such a clay or body can have but one permanent tint under normal conditions. Any irregularity or limitation of oxygen in the burning—through accident or design—will be surely set right by the atmosphere. A close, tight, vitreous body, as instanced by the best blue wares, would appear at first sight, to come under the same category, seeing the evident reduction. But here complex alkaline silicates are probably formed with partial fusion; such a body can hardly be compared to such as used in connection with high-class rubbers, facings and terra cotta. These wares, in their highest state of perfection, are justly prized for their rich, warm and delicate tint, and, given a good and suitable clay, and burning under proper conditions of oxidation, they give the nearest known approach to regularity and permanence in colour that may be attained.

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BOOK-KEEPING FOR BRICKMAKERS.—VIII.

APPENDIX.

BRICKMAKERS' ACCOUNTS.—FORMS.—*(Continued.)*

No 6.—THE EASTVILLE BRICK COMPANY.—IMPERSONAL LEDGER—*Continued.*

Salaries.

6

1896		J.B.	£	s.	d.	1896		J.	£	s.	d.
Sept. 30	To Cash	8	20	0	0	Dec. 31	By Profit and Loss	2	80	0	0
Oct. 31	do.	8	20	0	0						
Nov. 30	do.	9	20	0	0						
Dec. 31	do.	10	20	0	0						
			£80	0	0				£80	0	0

Agents' Commission.

7

1896		J.B.	£	s.	d.	1896		J.	£	s.	d.
Sept. 30	To Commission	9	15	0	0	Dec. 31	By Profit and Loss	2	69	0	0
Oct. 31	do.	10	20	0	0						
Nov. 30	do.	11	13	0	0						
Dec. 31	do.	12	21	0	0						
			£69	0	0				£69	0	0

Carriage and Carting.

8

1896		J.B.	£	s.	d.	1896		J.	£	s.	d.
Sept. 30	To Sundries	9	345	0	0	Dec. 31	By Profit and Loss	2	1,457	0	0
Oct. 31	do.	10	410	0	0						
Nov. 30	do.	11	320	0	0						
Dec. 31	do.	12	382	0	0						
			£1,457	0	0				£1,457	0	0

Bank Interest and Commission.

9

1896		C.B.	£	s.	d.	1896		C.B.	£	s.	d.
Dec. 31	To Commission	10	3	0	0	Dec. 31	By Interest	10	6	0	0
	,, Profit and Loss	J. 2	6	0	0		,, Profit and Loss	J. 2	3	0	0
			£9	0	0				£9	0	0

Discounts.

10

1896		C.B.	£	s.	d.	1896		J.	£	s.	d.
Oct. 31	To Allowed	9	15	14	0	Dec. 31	By Profit and Loss	2	50	12	0
Nov. 30	do.	10	12	19	0						
Dec. 31	do.	10	20	19	0						
	do. (Bill)	B.R. 1	1	0	0						
			£50	12	0				£50	12	0

Printing, Postages, &c.

11

1896		P.C.B.	£	s.	d.	1896		J.	£	s.	d.
Sept. 30	To Petty Cash	1	1	15	0	Dec. 31	By Profit and Loss	2	8	5	0
Oct. 31	do.	1	2	4	0						
Nov. 30	do.	2	1	18	0						
Dec. 31	do.	2	2	8	0						
			£8	5	0				£8	5	0

Travelling Expenses.

12

1896		P.C.B.	£	s.	d.	1896		J.	£	s.	d.
Sept. 30	To Petty Cash	1	3	15	0	Dec. 31	By Profit and Loss	2	14	8	0
Oct. 31	,, do.	1	5	12	0						
Nov. 30	,, do.	2	2	0	0						
Dec. 31	,, do.	2	3	1	0						
			14	8	0				14	8	0

General Expenses.

13

1896		P.C.B.	£	s.	d.	1896		J.	£	s.	d.
Sept. 30	To Petty Cash	1	0	10	0	Dec. 31	By Profit and Loss	2	42	7	0
		J.B.									
Oct. 31	,, Sundries	10	20	0	0						
		P.C.B.									
	,, Petty Cash	1	0	4	0						
Nov. 30	,, do.	2	0	12	0						
Dec. 31	,, do.	2	1	1	0						
		J.									
	, Transfer from Wages	1	20	0	0						
			42	7	0				42	7	0

Rates, Taxes and Insurance.

14

1896		J.B.	£	s.	d.	1896		J.	£	s.	d.
Oct. 31	To Insurance	10	10	0	0	Dec. 31	By Profit and Loss	2	50	0	0
Nov. 30	Poor Rate	11	40	0	0						
			50	0	0				50	0	0

Sales.

15

1896		J.	£	s.	d.	1896			S.D.B.	£	s.	d.
Dec. 31	To Profit and Loss	2	5,676	2	0	Sept.	By	700,000	10	1,347	6	0
						Oct.	,,	902,000	12	14,92	19	0
						Nov.	,,	650,000	14	1,221	14	0
						Dec.	,,	850,000	16	1,404	3	0
								3,102,000		5,466	2	0
									J.			
						Dec. 31		280,000 used Kiln "B"	1	210	0	0
			5,676	2	0			3,382,000		5,676	2	0

Stock.

16

1896		J.	£	s.	d.	1896		£	s.	d.
Dec. 31	To Profit and Loss	2	150	0	0	Dec. 31	By Stock, 200,000 Bricks	150	0	0
Dec. 31	To Stock		150	0	0			150	0	0

Bad Debts.

17

1896.		J.	£	s.	d.	1896		J.	£	s.	d.
Dec. 31	To Provision, 2 % on Sales	1	109	0	0	Dec. 31	By Profit and Loss	2	109	0	0
			109	0	0				109	0	0

Book Debt Provision.

18

		1896		J.	£	s.	d.
		Dec. 31	By Provision, 2 % on Sales £5.450	1	109	0	0
					109	0	0

No. 7.—THE EASTVILLE BRICK CO.—PRIVATE LEDGER.

Machinery and Plant. 19

Date		Particulars	Fo.	£	s.	d.	Date		Particulars	Fo.	£	s.	d.
1896							1896						
Sept	1	To Expended to date	J.B.	3.000	0	0	Dec.	31	By Balance		3,347	0	0
,,	30	,, Sundries	9	315	0	0							
Oct.	31	do.	10	15	0	0							
Dec.	31	,, Wages	J. 1	17	0	0							
				£3,347	0	0					£3,347	0	0
Dec.	31	To Balance		£3,347	0	0							

Freehold Land and Buildings. 20

Date		Particulars	Fo.	£	s.	d.	Date		Particulars	Fo.	£	s.	d.
1896							1896						
Sept.	1	To Expended to date		9,000	0	0	Dec.	31	By Balance		£11,500	0	0
Dec.	31	,, Ronald, J. R., for adjoining 12¼ acres...	C.B. 10	2,500	0	0							
				£11,500	0	0					£11,500	0	0
Dec.	31	To Balance		£11,500	0	0							

Kilns.—A. 21

Date		Particulars	Fo.	£	s.	d.	Date		Particulars	Fo.	£	s.	d.
1896							1896						
Sept.	1	To Expended to date		3,000	0	0	Dec.	31	By Balance		3,000	0	0
Dec.	31	To Balance		£3,000	0	0							

Kilns.—B.

Date		Particulars	Fo.	£	s.	d.	Date		Particulars	Fo.	£	s.	d.
1896							1896						
Sept.	1	To Expended to date		2,000	0	0	Dec.	31	By Balance		2,250	0	0
Dec.	31	,, Bricks used from Sept. 1st to date, 280,000	J. 1	210	0	0							
		,, Wages		40	0	0							
				£2,250	0	0					£2,250	0	0
Dec.	31	To Balance		£2,250	0	0							

Mortgage. 22

Date		Particulars	Fo.	£	s.	d.	Date		Particulars	Fo.	£	s.	d.
							1896						
							Sept.	1	By Balance, amount advanced by J. Reed at 3½ % per annum		4,5000	0	0

Mortgage Interest. 23

Date		Particulars	Fo.	£	s.	d.	Date		Particulars	Fo.	£	s.	d.
1896							1896						
Dec.	31	To Half-year's interest on £4,500 at 3½ %, less tax	C.B. 10	76	2	6	Dec.	31	By Profit and Loss	J. 2	76	2	6

G. H. Capital Account. 24

Date		Particulars	Fo.	£	s.	d.	Date		Particulars	Fo.	£	s.	d.
1896							1896						
							Sept.	1	By Balance		8,000	0	0
Dec.	31	To Transfer Drawings	J. 1	50	0	0	Dec.	31	,, Interest	J.	130	0	0
		,, Balance		9,126	18	6			⁴⁄₅ths Share of Profit	J. 2	1,046	18	6
				£9,176	18	6					£9,176	18	6
							Dec.	31	By Balance		£9,126	18	6

G. H. Drawing Account. 25

Date		Particulars	Fo.	£	s.	d.	Date		Particulars	Fo.	£	s.	d.
1896							1896						
Oct.	20	To Cash	C.B. 8	50	0	0	Dec.	31	By Capital Account	J. 1	50	0	0
				£50	0	0					£50	0	0

INSTITUTE OF CLAYWORKERS.

AN APPEAL TO THE TRADE.

THE Institute of Clayworkers has been making such steady and unostentatious progress during the past few years, that its claims are apt to be overlooked by many who have not yet been brought into direct touch with its operations. Started in 1895, with a handful of members, it now totals over 350 strong, and not a week passes but what new recruits are added to the number. It is now a body that demands attention in the country, representing as it does one of the most active, enterprising and wealthy trades of Great Britain.

ITS SOCIAL AIMS.

It has both a social and business side, the former, perhaps, appealing to more members than the latter. It has been the means of bringing brickmakers from all parts of the country into touch, and the phenomenally successful foreign trips of its members during the past three years, should alone be a sufficient reason for its continuance, even were no other claims made in its behalf.

ITS BUSINESS ADVANTAGES.

The business advantages it offers are apt to be overlooked, even by its most active members. At the Offices of the Institute, at 43, Essex Street, Strand, are provided rooms for the members, where they may make appointments and generally conduct their business when in town ; in fact they can have all the advantages of a London office, with full clerical service.

In a spacious room are exhibited clay-working goods from all parts, and members have the right to exhibit samples of their productions for the inspection of likely purchasers. The architectural profession is becoming more and more cognisant of the fact that here they can see the products of brick manufacturers without being asked to buy, and many have availed themselves of this privilege to the decided advantage of the exhibitor.

ITS ACTIVE PROPAGANDA.

One of the objects of the Institute is to watch over the interests of clay-working generally, and matters are considered by the Committee as they arise. The Institute has been able to obtain valuable concessions in the matter of traffic rates from the Great Eastern Railway, while at the time of the introduction of the Workmen's Compensation Act, a meeting to discuss the Bill was held at the Institute under the presidency of Sir Alfred Hickman, M.P. This Act gave the Institute a subsequent opportunity of showing its power by combining and forming a Limited Liability Company, in order to resist the exorbitant charges for insurance asked by existing offices. How that combination has justified its action is now matter of history.

ITS FINANCIAL POSITION.

No one has yet been able to accuse the Institute of charging prohibitive fees. The subscription is one guinea only, and as this includes a copy of the *British Clayworker* monthly, the actual cost to become a member is 14s. per annum. The Institute is solvent, has a benevolent fund, and its affairs are conducted at a minimum of expense. A copy of its last report and balance-sheet may be obtained upon application to the Secretary. We appeal to all readers of this journal to assist in strengthening this trade combination, which holds out great possibilities for the future.

The following is a list of members :—

Adams, A., St. Michael's House, Fletton, Peterboro'.
Adams, D. R., Inkerman Brick Works, Paisley, N.B.
Ahern, M., Bounds Green, New Southgate, N.
Ainley, John, Ash Grove Brick and Tile Works, Elland, Yorks.
Albion Clay Co., 18, New Bridge Street, E.C.
Allen, G. L., Maddiston Brick Works, Polmont Station, N.B.
Allen, J. J., Brick Works, Ballygarvon, near Cork.
Allen, R. A., & Sons, Sudbury, Suffolk.
Allen, W. H., Newcastle-on-Tyne.
Ansell, H., Belgrade, Barrhead, near Glasgow.
Arch, James, 68, Sussex Street, Sheffield.
Armstrong, Thos., Northampton.
Ashburner, Barrow & Co., Ballanard, Douglas, Isle of Man.
Ashton Vale Iron Co., Ltd., Bedminster, Bristol.
Atterbury, B. J., New Malden, Surrey.
Bailey, Irvine, "Skey & Co., Ltd.," Tamworth.
Barnett, Saml., Burnt Tree, Tipton, Staffs.
Barrack, G., "Stone & Co., Ltd.," Epsom, Surrey.
Barttelot, Sir Walter, Bart., Pulborough.
Batley, S. R. S., Southampton.
Batley & Co., 191, Shobnall Road, Burton-on-Trent.
Bazzard, Thos., Tile and Pottery Works, Swindon, Wilts.
Beaty, John, Harraby Green, Carlisle.
Beck, W. A., Connelmore, Newbridge, Co. Kildare, Ireland.
Beddow, J. B., Shelfield, Walsall.
Beddow, J. J., Shelfield, Walsall.
Beeby, A., "Beebys, Ltd.," Peterborough.
Bell, R. M., Roughdales Brick and Iron Co., Ltd., St. Helens.
Bennett, Thos., Brick Works, Bracebridge, Lincoln.
Bennett & Sayer, Engineers, Derby.
Bird, Stephen, 20, Queen Street, Cheapside, E.C.
Birks, J., Hartshill Brick and Tile Co., Stoke-on-Trent.
Bishop, A., Brockham Brick Co., Betchworth, Surrey.
Benckendorf, W. O., Dorset House, Thames Ditton.
Blades, B. W., Swan Farm, West Bromwich.
Boelte, A. (A. Koppel), London.
Bogaert, M. Cl. Van, Brussels.
Bowley, Jos., Builder and Contractor, Lechlade, Glos.
Bowman, Hy., Marehay, Ripley, Derby.
Branton, F. G., Greenhithe, Kent.
Bray, H., & Co., Bentinck Buildings, Nottingham.
Breething, E., Dunton Green Brick Works, Ltd., Sevenoaks.
Breething, Jos. Wm., Bazley White & Son, Erith, Kent.
Broad, C. B., 4, South Wharf, Paddington, W.
Brodie, Jas., Ltd., Sanquhar, N.B.
Brown, J. W., 48, Robertson Road, Eastville, Bristol.
Brown, Robt., jun., Lambfield, Dungannon, Co. Tyrone.
Brown, W. J., Galwally Park, Ormeau Road, Belfast.
Buck, T., Stanley Road, Cambridge.
Burridge, Hy., 41, Cauldwell Street, Bedford.
Caddick, John, Spoutfield Tileries, Stoke-on-Trent.
Cadell, Jas. Jno., Carron Park, Larbert, N.B.
Cafferata & Co., Beacon Hill, Newark-on-Trent.
Callender, G. M., 9, Victoria Street, Westminster, S.W.
Carter, Alf. T. S., 292, Brockley Road, S.E.
Carter, G. & W. H., 36, Tower Street, West Hartlepool.
Carter, H. J., Builder, &c., Grays, Essex.
Carter, Wm., Kinson Potteries, Parkstone, Dorset.
Carter & Co., Encaustic Tile Works, Poole, Dorset.
Chadwick, John, Surveyor, Fenny Stratford.
Chandler, W. G., Broughton Astley, near Rugby.
Chapman, W. T., Terra-cotta Works, Cleethorpes, Grimsby.
Chappell, J. T., Fontley Brick Works, near Fareham, Hants.
Chilton, D. S., Alsager, Stoke-on-Trent.
Christie, A., jun., Glencairn, Tullos, Aberdeen.
Christie, James, 8, North Street, Elgin, N.B.

Clark, W. F., Aldridge Colliery Co., Ltd., Aldridge, Walsall.
Clover, W., Brick and Tile Manufacturer, Boreham, Chelmsford.
Collen, F. D., Seagrove Brick Works, Portadown, Ireland.
Collier, S. & E., Grovelands, Reading.
Collier, W. H., Marks Tey, near Colchester.
Colthurst, Symons & Co., Ltd., Bridgwater.
Cook, J. D., Meersbrook Park Road, Heeley, Sheffield.
Cooke, F. H., Priestgate, Peterboro'.
Cooper, C., Florence Villa, Finchley Lane, Hendon, Middlesex.
Cottis, Crispus, Epping Foundry, Epping, Essex.
Courtis, J. W., J.P., 98, St. Mary Street, Cardiff.
Cozens, Walter, Dover Street, Canterbury.
Crooke, Wm. T., Byron Brick Co., Palterton, Derbyshire.
Crossley, A., Commondale Brick Co., via Grosmont.
Cunliffe, Wm., Gloucester Road, Kingston.
Cunnell, Chas., 8, Newmarket Road, Norwich.
Curry, J. T., 3, Thornton Villas, New Road, Grays, Essex.
Darnell, P. S., Coxhill House, Chobham, Woking, Surrey.
Davies, H. C., Bordesley Green Brick Co., Birmingham.
Davies, Howell, Hill Street, Wrexham, N. Wales.
Davies-Cook, Colonel B. C. Colomendy, Mold, N. Wales.
Davis, W. H. H., Lynn Road, Wisbeach.
Derrington & Sons, Dartmouth Street, Birmingham.
Doughty, John & Sons, Jackfield, Salop.
Downing, G. H., Lymore Villa, Chesterton, Staffs.
Dudley, Chas., Station Brick and Tile Works, Woburn Sands.
Duncan, Geo. & Son, Pugeston Brick and Tile Works Company, By Montrose, N.B.
Dutton, James, Fairclouth, Gorse Hill, Helsby.
Eaton, John, Rosslyn House, Thurnscoe, Rotherham, Yorks.
Eaton, Wilfred H. H., Longsdon, Stoke-on-Trent.
Ellingham, W. G., High Street, Green, Hemel Hempstead.
Erith, Chas., & Co., 70, Gracechurch Street, E.C.
Evans, H. A., Brougham Road, Southsea.
Evans, Robt., Slate Works, Rhyl, N. Wales.
Ewart, G. Herbert, 9, Bedford Street, Belfast.
Fawcett, T. C., Ltd., Engineering Works, Hunslet, Leeds.
Featherby, G., The Vineries, Gillingham, Kent.
Fowle, John, Architect, Boulder-on-Sea; Yarmouth, I. of W.
Fox, Wm. S., Manor House, Potter Hanworth, Lincoln.
Fuller, Alfred, Ramsey, Hunts.
Gardener, Richd., Fletton, Peterboro'.
Garforth Bros., Mirfield, Yorks.
Garside, B., & Son, Worksop, Notts.
Gentry, Mark, Sible Hedingham.
Gibbon, Wm., Henry Street, Hale Road, Altrincham, Cheshire.
Gibbs; W. C., F. Thoday & Co., Ltd., Cambridge.
Gibbs & Canning, Ltd., Glascote Works, Tamworth.
Gibson, J. M., Buckley Brick and Tile Co., Buckley, Chester.
Gilman, Frank, Dovercourt, Edgbaston Road, Smethwick.
Gilmour, Wm., Pitfour Brick and Tile Works, Glencarse, Perth.
Glasspool, R., Rye House Brick Co., Ltd., Hoddesden, Herts.
Goff, James, Sydney Road, Coburg, via Melbourne, Australia.
Goad, F. L., Coma Villa, South Benfleet, Essex.
Goodall, Geo., jun., 28, Rowlands Road, Worthing.
Gregory, Wm. Machon, Bank Lodge, Sheffield.
Griffiths, L. T. J., Cross Roads Kiln, Brill, Bucks
Gunton, Geo., Costessey, Norwich.
Hadley, J., Gower Blue Brick Works, Oldbury.
Hamblet, Jos., West Bromwich, Staffs.
Hamblett, A., Saw Mills, Winsford, Cheshire.
Hampton, E., & Sons, George Street Pottery, Hanley, Staffs.
Handley, Edward, Albion House, Lincoln.
Handley, Edward, jun., 3, Leamington Park, Acton, W.
Hardy, Chas. W., Rowditch House, Uttoxeter Road, Derby.
Harper, R. B., 1, Church Road, Willesden, N.W.
Harrison, J. M., Norman Street, Lincoln.
Harry, R. J., Towcester Brick Works, Towcester, Northampton.
Hartley, E., Star Brick Works, Llantarnam, Mon.
Hawkes, Hy., Whitemoor Brick Works, Kenilworth, Warwick.
Heaton, Jas., Sanitary Pipe Works, Ravenhead, St. Helens.
Hemmings, W., Poplar Farm, Ewell, near Epsom.
Herbert, Ernest Rowland, Norman Cross, Peterboro'.
Herbert, Henry, 25, Millstone Lane, Leicester.
Herbert, John Arthur, J.P., Norman Cross, Peterborough.
Higson, Jos., Daubhill Brick Works, Bolton.
Hill, C. Gray, Vauxhall Brick and Tile Works, Coventry.
Hill, Jno. C., London Brick Co., 7, Archway Road, N.
Hobman, A. C. W., Stockholm Road, South Bermondsey, S.E.
Hogg, Henry, Parkfield Terrace, Lancaster.
Holdcroft, J. P., Cannon St. Brick Works, Hanley, Staffs.
Holland, R., 333, Gt. Cheetham Street, Higher Broughton.
Holloway, Thos., Battersea, London, S.W.
Holwill, Eustace, 7, Temple Chambers, Temple Avenue, E.C.
Holwill, Henry, Torrington, Devon.
Hooper & Co., County Wharf, Southampton.
Howard, G., Vauxhall Brick Works, Foleshill Road, Coventry.
Howl, Oliver, The Tibbington Collieries, Tipton, Staffs.
Hudson, John, Barwell Lane, Hinckley, Leicestershire.
Hughes, Edward, Jervoise Street, West Bromwich.
Hughes, W. B., Prospect Lodge, London Road, Tunbridge Wells.
Hulme, Thos., 67, Bryan Street, Hanley, Staffs.
Hunter, S. J. W., Thos., Middleton & Co., London.
Ingleby, Holcombe, Heacham Hall, Heacham, Norfolk.
Jacobs, J. A., Bellingdon Brick Co., Bellingdon, Chesham.
Jefferies, S., & Sons, Dudbridge, Stroud, Glos.
Jenkinson, Wm., Hyde Cottage, The Hyde, Middlesex.
Jewson, F., J.P., Earith, Hunts.
Joberns, Jos., & Co., Aldridge Tileries, near Walsall.
Johnson, F., 18, Salisbury Grove, Armley, Leeds.
Johnson, Geo., Melbourne Street Brick Works, Morley, Leeds.
Johnson, Wm., Castleton Foundry, Armley, Leeds.
Jones, Chas. Hibbert, 76, Barrows Street, West Bromwich.
Jones, Jno., & Sons, Ltd., Britannia Iron Works, Loughboro'.
Jones, J. H., Broseley Roofing Tile Works, Jackfield, Salop.
Jones, Parry, Newtown, Mon.
Jones, Wm., Rumer Hill Tileries, Cannock, Staffs.
Jopling, Joseph, Wallington, Surrey.
Kemp, George, Aldershot.
Kemna, A., D.Sc., Antwerp.
King, Geo., East Haddon, Northampton.
Knock Brick Works, Ltd., Belfast.
Knowles, John, & Co., 38, Kings Road, St. Pancras, N.
Knowles, T., Spring Vale Fire Clay Works, Darwen, Lancs.
Kirkaldy, D., London.
Knox, Jas., Haunchwood Brick and Tile Co., Nuneaton.
Lambourne, W. T., 73a, Southwark Bridge Road, S.E.
Laverick, J. H. W., Pye Hill, near Nottingham.
Lavington, C. W., Woolpit Brick Co., 2, Woodberry Down, N.
Laxton, J. C., Bell Hotel, High Street, Ely.
Lee, E. P., 29, The Parade, Cardiff.
Legender, W. P., 15, Norfolk Street, Sunderland.
Legge, Geo., & Son, Madeley, Salop.
Lindley, W., Whitwick Colliery Co., Ltd., Coalville, Leicester.
Lintott, Walter, Wallands, Lewes.
Lissimore, Thos., Irthlingborough.
Loach, A., Rosemary Tileries, Cannock, Staffs.
Lofts, A. E., The Stilwell Brick Co., Old Fletton, Peterboro'.
Loughton, J., jun., Brick Works, Garrison Lane, Birmingham.
Lucas, J. W., Bournemouth.
Mackenzie, D., & Son, Clacton-on-Sea.
Macqueen, Wm., J. Army and Navy Mansions, Victoria St., S.W.
McRae, Joseph, 46, Bermondsey Street, S.E.
Marr, Arthur N., 27, Victoria Square, Leeds.

Major, H. J., & C., Bridgwater.
Malton, Wm., 28, Barwick Street, Scarborough.
Marley, Jno. B., Minehead, Somersetshire.
Mason, A., & Son, Horwich, near Bolton, Lancs.
Mason, S., Crown Blue Brick Works, Toll End, Tipton, Staffs.
Matthews Bros., Grimshaw Park Brick Works, Blackburn.
Matthews, Jos., Churchbridge, Oldbury.
Matthews, W., & Sons, Whalley New Road., Blackburn, Lancs.
Meeds, W., & Sons, Brick and Tile Manufacturers, Burgess Hill.
Meikle, J., 3, Claremont Terrace, Sunderland.
Middlemiss, T. F., Steam Brick Works, Bishopstoke, Hants.
Milsom, W. G., Messrs. Milsom & Sons, Reading.
Montgomery, H. Greville, London.
Mottram, Wm., Don Brick Works, Leppings Bridge, Sheffield.
Mountain, B., South Parade, Leeds.
Mueller, A., 420, East 23rd Street, New York City, N.Y.
Nash, John, 31, Rona Road, Hampstead, N.W.
New Ferry Brick Co., New Ferry, Cheshire.
Non-porous Tile Co., High Carr, Chesterton, Staffs.
Norman, J. T., Avalon, Putney Common, S.W.
Normanby Brick Co., Normanby, Middlesboro'.
Normanton, C. H., Portsmouth Street, Chorlton-on-Medlock.
North, A. L., Cakemore, Blackheath, Dudley.
Nye, Geo. E., Messrs. Bradshaw, Brown & Co., Surveyors, Billiter Buildings, E.C.
Odd, R. C., 6, Fletton Road, Bowes Park, N.
Ormrod, Arthur, Shiptons, Bolton.
Osman & Co., Exmouth, Devon.
Owens, Evan, Pentyrch Brick Works, near Cardiff.
Parker, A. Robinson, Langdon Hill Brick Works, Romford.
Partridge, W. E., Kingswinford Brick and Tile Works, Dudley.
Patching, Edward C., 1, Chapel Road, Worthing.
Payne, Chas. Jas., Shute Park, Plymouth.
Peake, Jno. N., The Tileries, Tunstall, Staffs.
Penny, Thos. S., Tone Bridge Timber Yard, Taunton.
Phillips, John W., 28, Alexander Road, Bedford.
Pitt, H. L., Bowens, Ltd., Stourbridge.
Place, Jos., & Sons, Hoddesden Fire Clay Works, Darwen.
Plowman, E., Stanpit, Shefford, Beds.
Podger, Walter, 6, Elton Road, Bishopton, Bristol.
Potter, Frank, 4, North Parade, Horsham, Sussex.
Poulter, Wm., Durrow Brick Co., Queen's Co.
Poulton, Wm., Poulton & Sons, Reading.
Powell, J. & W., Ewloe Pottery, near Mold, N. Wales.
Priestley, W. H., Natal Potteries, Ltd., Pietermaritzburg.
Pullan & Mann, Leeds.
Rayner, S. D., Brick Works, Rottenden Common, Essex.
Riches, G., J.P., Cromer.
Rix, Wilton, Liverpool Road, Newcastle, Staffs.
Roberts, Alderman Henry, Warrington.
Roelofs, Paul, Antwerp.
Robson, J. J., 17, Burch Road, Gravesend.
Round Bros., Tividale, near Tipton, Staffs.
Rowe, J. W., Millfield, Peterboro'.
Rowley, W., Metallic Tile Co., Chesterton, North Staffs.
Rutot, M. H., Brussels.
Sadler, S. J., Portway Blue Brick Works, Oldbury.
Sampson, J., Polsloe Road, Exeter.
Sanderson, J. P. S., Ashtead Brick Works, Ashtead, Surrey.
Sandy, Jno., The Fareham Potteries, Fareham, Hants.
Satchell, Wm., 42, Chapel Street, Rugby.
Scholefield, Richd., Burley Vale Mills, Kirkstall Road, Leeds.
Scott, T. J., Brick Works Co., Ltd., Skelmersdale, Lancs.
Seaton Brick and Tile Co., Ltd., 51, Guild Street, Aberdeen, N.B.
Sercombe, W., Leicester.
Seymour, D., Lugworth Brick Yard, Haywards Heath, Sussex.
Shaw, Arthur, Estate Office, Elvedon, Thetford.
Shaw, J. H., Sandford Pottery, Wareham, Dorset.
Shenton, Jas., Consulting Engineer, West Bromwich.
Sherburn House and Birtley Brick and Tile Co., Hetton-le-Hole.
Shillitoe, M., 63, Fore Street, E.C.
Shillitoe, T., Bury St. Edmunds.
Ship Canal Co., D. Parkinson, Hamilton Road, Longsight.
Silcock, T. B., The North Swindon Estate Co., Ltd., Bath.
Simpson, A. J., Hesworth Brick Co., Haverhill, Suffolk.
Sims, Jno. D., Ransomes, Sims, & Jefferies, Ipswich.
Skelding, W. T., The Ketley Brick Co., Brierley Hill, Staffs.
Slinn, W. H., 19, Ennesdale Road, Lewisham, S.E.
Smart, Thos., Trent Bridge, Nottingham.
Smart's Brick Works, Ltd., California, Northfield, Worcester.
Smith, J. Campbell, Borough Surveyor, Bury St. Edmunds.
Smith, W. A., 18, Albion Place, Northampton.
Smith, Wm. W., Remenham, Worthing.
Smith-Harvey, S., 11, Queen Victoria Street, E.C.
Sneyd Colliery and Brick Works Co., Ltd., Burslem, Staffs.
Stanley Bros., Nuneaton.
Statham, Arnold, 12, King's Bench Walk, E.C.
Stephenson, A. H., Globe Brick and Tile Co., Birmingham.
Stephenson, H., & Son, Huncoat, Accrington, Lancs.
Stinson, H. L., Gloucester Road, New Barnet.
Stonehouse Brick and Tile Co., Ltd., Stonehouse, Glos.
Swann, H. & A., Bros., Ltd., 93, East Street, Cambridge.
Swinney, Alex., 61, Newgate Street, Morpeth.
Symington, H., & Sons, Kipps Quarries, Coatbridge, N.B.
Tassell, John, Ivy Cottage, St. John's, Woking, Surrey.
Taylor, Harry W., St. Nicholas Chambers, Newcastle-on-Tyne.
Thompson, Joel, High Royd, Hoyland, Barnsley, Yorks.
Thornton, James, 23, Ivanhoe Road, Sefton Park, Liverpool.
Tomlinson, J., & Son, Lyons Street, Carlisle Street, Sheffield.
Tomlinson, W., Gospel Oak Brick Co., Gospel Oak, N.W.
Tompkin, S., Monsall St. Miles Platting, Manchester.
Towers & Williamson, Little Bytham, Grantham.
Triggs, Phillip, Whitsun Chambers, Nicholas Street, Bristol.
Turle, Edward, Haslemere, Surrey.
Tucker, W. T., F.G.S., Parkside, Loughboro'.
Tugby, Hosea, Moira, Ashby-de-la-Zouch.
Turner, A. Scott, 16, Torphicen Street, Edinburgh.
Turner, H. A., Peninsular House, Monument Street, E.C.
Tushingham Bros., Garston, Liverpool.
Tymm, J. & M., Rose Hill, Marple, Stockport.
Vanderbroeck, M. E., Brussels.
Vass, A. H., Fairfax Road, Belgrave, Leicester.
Vaughan, H. R., Lagan Vale Brick Works, Belfast.
Wall, Frank, Globe Works, Grays, Essex.
Wallace, Jno. B., Old Park Brick Works, Belfast.
Ward & Payne, Northfield, Worcs.
Warren, Geo., Engineer, Exmouth.
Warren, Hy., Brick Works, Culford, Bury St. Edmunds.
Warrington & Sons, Berry Hill Brick Works, Stoke-on-Trent.
Watson, Chas., Napton-on-the-Hill, Rugby.
Watts, Mrs. Geo. Fredk., Limners Lease, near Guildford.
Webb, Edward, Summertown Brick Works, Oxford.
Webster, Edgar, Wood & Ivery, Ltd., West Bromwich.
Webster, John, Webster & Cannon, Aylesbury, Bucks.
Webster, T. H., Mid-Essex Brick Works, Stock, Essex.
Weston, J. H., Hazeldene, Harrison Road, Leicester.
Wheatly, S. W., Butterton, Newcastle, Staffs.
Wheeler Bros., Brick and Pottery Works, Reading.
White, Joseph, 12, Berwick Road, Gateshead-on-Tyne.
Whitehouse, Jas., Nottingham.
Whiteway, Wm., 37, Coal Exchange, E.C.
Whittaker, C., & Co., Dowry Street, Accrington, Lancs.
Whyte, A., Raneegunge Pottery Works, Raneegunge, India.
Wickham, Geo., Limpsfield, Surrey.

Wilding, E. E., c/o Walker, Sons, & Co., Ltd., Colombo, Ceylon.
Willett, Wm., 2, Sloane Gardens, S.W.
Williams, G. W., Cwmbran Brick Co., Newport, Mon.
Williams, J., Umbilo, Durban, Natal, South Africa.
Wilmott, A. J., Builder, Hitchin.
Wilson, J., Gorring Park, Mitcham.
Winter, T. S., 14, Hartington Terrace, South Shields.
Wodson, T. W., 41, Essex Street, Woodstock, Capetown.
Wolff, Dryer Co., 89-91, Sumner Street, Southwark, S.E.
Wood, F. C., Bank Chambers, Baldwin Street, Bristol.
Wood, Geo., & Sons, Brades Brick Works, Oldbury.
Wood, Henry Ernest, Highlands, Champion Hill, S.E.
Wood, P. & S., West Bromwich.
Woolliscroft, Geo., & Son, Hanley, Staffs.
Wootton, John, Engineer, Coalville, Leicester.
Workman & Co., Townsend Street, Belfast.
Wright, W. T., Albion Brick Works, Sileby, Leicestershire.
Wyndham, Hy., Delph Fire Clay Works, Ruabon, N. Wales.
Young, Joseph, Hillmorton Road, Rugby.

THE WORKMEN'S COMPENSATION ACT, 1897.

Fatal Accident.—On Tuesday last, whilst a workman was engaged digging clay at the works of the Mexborough Brick and Tile Co., a piece of clay become suddenly detached, striking the unfortunate man so that death ensued almost immediately.

Crushed to Death.—On August 22nd, a youth named James Dean, aged 16, was accidentally crushed while at work at Davison's brick works, Fulwell Road, Sunderland. He was conveyed to the Monkwearmouth and Southwick Hospital, but was found to be dead when that institution was reached.

A Fatal Step.—Mr. F. H. Potts (borough coroner) held an inquiry touching the death of Thomas Goodall, assistant engineer, who was killed when working at Messrs. Exley and Son's brickworks, Jackfield. It appeared from the evidence that deceased was superintending a grinding-mill, when he stepped from a scaffolding on to the casting above the machinery, and fell on to a cog-wheel. He was so terribly injured that he died in a few minutes.—The jury returned a verdict of "Accidental death."

Collapse of a Kiln.—On August 18th, an accident happened at the Northumberland brick-works, Howdon, to two men named Joseph Wardle, of South Shields, a joiner, and Robert Hall, of North Shields, a labourer. These two men were working inside one of three kilns which had just been completed, when the whole of the kilns collapsed, and the men were buried underneath tons of bricks and woodwork. The men were soon rescued, and taken to the Tynemouth Hospital. Several other men were working on the top of the kilns at the time of the collapse, but they escaped with very slight injury. Two of the men have since recovered; one, however, lies in a serious condition.

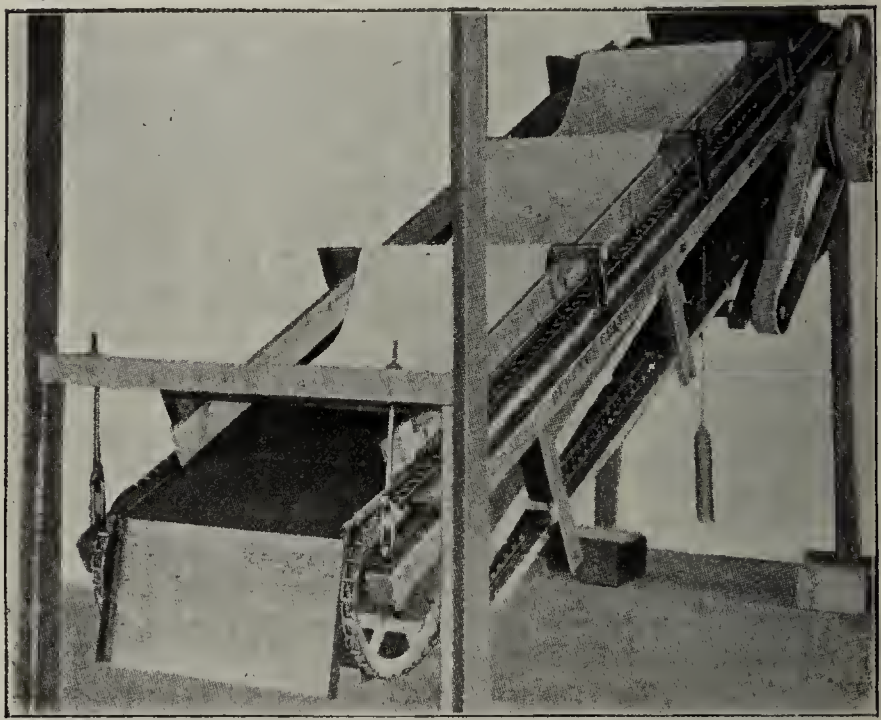
10/9 per Week for Life, if you please.—At the Stourbridge County Court, before Sir R. Harington, Bart., a case was entered under the Workmen's Compensation Act, in which Thomas Mills, clay miner, was the applicant, and Messrs. Mobberley and Perry, fire-clay manufacturers, respondents. It was a claim for injuries to Mill's spine.—Mr. Hinds said he represented the applicant, and the respondents had sent him an agreement to an award upon the basis of a weekly wage of 21s. 6d., and he asked for an award of 10s. 9d. per week. There was no period, and his Honour said: It will be for life then?—Mr. Hinds: If you please, Sir.—Costs were granted on the £50 scale up to the date of respondents' letter agreeing to an award.

QUERIES AND REPLIES

American Clay Screen.—*In your number, November '97, you gave some particulars of a Clay Screen manufactured by Messrs. Elder and Dunlap, U.S.A. Can you give me any further information as to this?*—W. P. L.

Messrs. Elder & Dunlap, Bloomington, Ill., U.S.A., favoured us with particulars of their screen a short time ago, and we are glad to have the opportunity of giving them to our correspondent. This firm are themselves brickmakers, and the screen is the outcome of practical experience. The following are some particulars concerning the working of the apparatus:—

"This screen is made with the necessary frame-work to hold in shape the gearing, sprocket wheels, chain, and screen plates, which consist of a number of perforated metal plates, the several plates forming an endless sheet of metal, each plate lapping over the one following it, forming a continuous sheet. These plates are turned up two inches on each end, connected by sprocket chain and attachments. The plates are reinforced with iron plates on all sides and edges, in order to be able to sustain any weight of clay they may be subjected to. The attachments are so arranged that the circuit around the ends is made without any friction or bending the plates. As they make this circuit, the rear end lifts away from the plate following it, allowing the screened clay, as it drops from the lower end of the floor, to fall directly into the bin. The system of curtains on the screening surface are for keeping the clay in contact with the metal, the clay being spread out thin before it is discharged on to the screen proper. The curtains then hold it in check, and as the metal plates are travelling upward and the clay down, the curtains create a sifting motion, compelling each and every particle of clay to come in direct contact with the perforated metal before it gets to the lower end. It thus gets the benefit of the full size of the perforations over the entire screening surface, allowing nothing but the particles that are too coarse to go through the perforations, to go over with the tailings.



Standard Size Screen. Length 16ft., width over all 5ft. 6in., capacity one 9ft. dry pan.

ARTHUR KOPPEL,

PENINSULAR HOUSE, MONUMENT STREET, **LONDON, E.C.**

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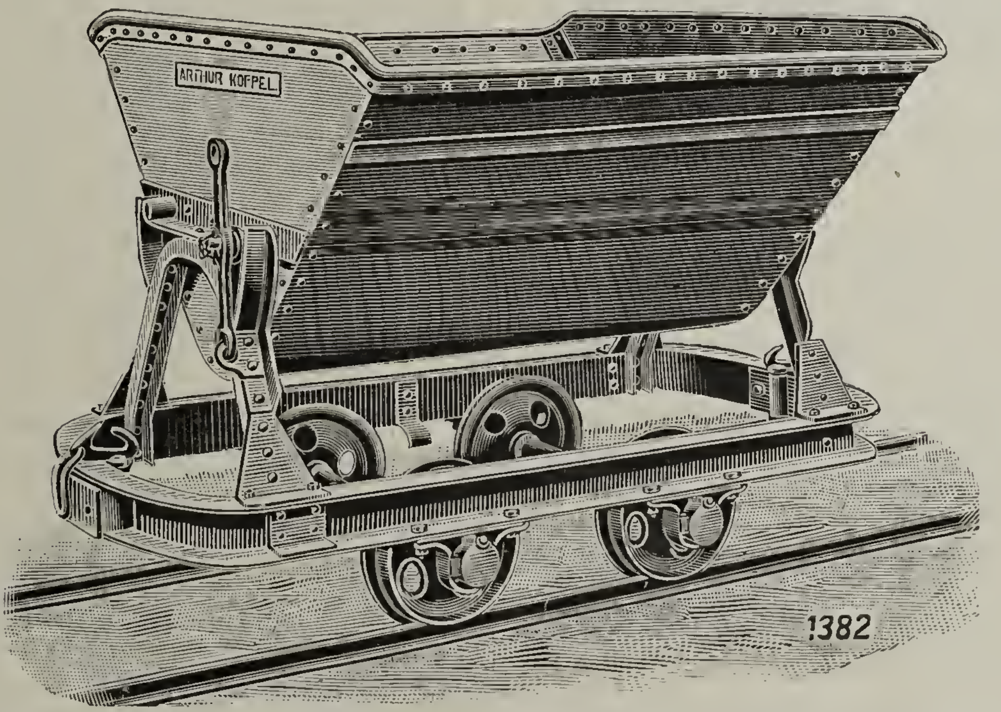

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POST FREE
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STANDARD STOCK SIZES OF STEEL "DOUBLE SIDE" TIPPING WAGONS.

10 cubic feet, 16in. gauge. 12 cubic feet, 18 and 20in. gauge. 18 cubic feet, 18, 20 and 24in. gauge. 27 cubic feet, 24in. gauge.

"DOUBLE END" AND "ALL ROUND" TIP WAGONS ALSO STOCKED.

GREEN BRICK CARS

FOR TUNNEL DRYING,

MADE BY SPECIAL MACHINERY OF BEST STEEL THROUGHOUT AND ALL FITTED WITH

HARDENED STEEL ANTI-FRICTION ROLLER BEARINGS.

ANY TYPE QUOTED FOR ON RECEIPT OF ENQUIRIES.

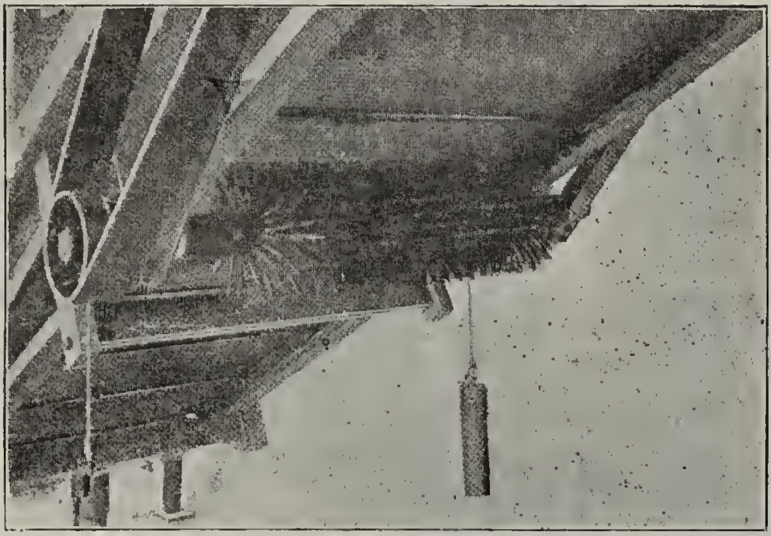
STEEL TIPPING SKIPS

(CRANE BUCKETS),

Of Improved Type, made of Steel throughout.

SIZES KEPT IN STOCK:—$\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ & 1 CUBIC YARD.

The floor upon which the screened clay drops is between the upper and lower sheets of metal and is allowed considerable more of an incline than the screening surface, thus relieving the possibility of clogging. As the clay drops on to this floor it descends to the lower end, where it drops through between the screen plates as one lifts away from the one following it in making the circuit. At the lower end the clay falls directly into the bin.



View on under side, showing action of Rotary Brush on Screen.

The cleaning is accomplished by a rotary brush, which is suspended on the under side by means of weights, and is adjustable to suit any requirement, and as the plates are travelling from the top downward, the brush running in the opposite direction, the plates being upside down, exactly in the reverse position from what they are while on the screening surface, and not being in use long enough at a time to become clogged, the brush thoroughly removes each and every particle that sticks to the plates or gets wedged into the perforations, always giving a clean, bright surface and keeping the perforations open."

[If any of our readers possess one of these screens we shall be glad to have their experience of its use.]

What is a Mineral ?—*I have recently changed my landlord, and he now raises a point as to whether I am entitled to* everything *that I can take from my land—most of which is brick-earth. My lease gives me the right to " minerals." Can you tell me if there is any limitation to the word?*

No, there is no limitation as far as you are concerned. It was long since decided that clay is a mineral, but for your satisfaction you may be glad to know the ruling of a Lord of Appeal in a famous case, in which he held that mineral "includes every substance which can be got from underneath the surface of the earth, for the purpose of profit."

Fire Bricks.—*On page 82 of " Science of Brickmaking," mention is made of the Dinas firebrick, and surprise that the sands found in the South of England are not used for the manufacture of such good firebricks as they would make with the addition of from one to five per cent. of lime. Would you kindly say if you think sand would hold together with one per cent. of lime, and if used with a hand-power brick press it would dry hard and stand piling in a kiln for burning. I have five sorts of sand, quite different, and think most likely one sort at least would do if any sand would make a brick. Is it lime or chalk that is added in powder ?*

The proportion of fluxing material to be added to a highly siliceous sand depends entirely upon the natural fluxing material already in the sand. Thus, when we say, in the " Science of Brickmaking " (p. 53), that " from one to three per cent. of lime is added," we are assuming that where one per cent. could be profitably employed there is already about two per cent. of lime (or equivalent flux) in the sand. And when as much as three per cent. is added there is little or no such flux in the sand. We do not suppose for a moment that the addition of one per cent. of lime to pure quartzose or flint sand would hold the brick together in the kiln, but if our esteemed correspondent will read what is said in our manual above mentioned (pp. 81 and 82), he will note that the material of which the Dinas bricks are made consists not only of pure sand, but it has a small proportion of clay (silicate of alumina), and this latter assists the added lime in holding the brick together when in the kiln. We may state, also, that very little bind is really necessary, provided the silica brick is formed under considerable pressure. It is doubtful whether such an earth could be made to advantage into bricks by means of a hand-power press, though we have never tried the experiment. You seem to have several varieties of sand, and the one which would appear to answer the purpose best is the " sharp white sand." At the same time, no man living could estimate the quality of a sand for such purposes as you mention by a description contained in three words. By the term lime is meant carbonate of lime, and not builders' lime. Powdered chalk would do.—G. F. H.

Replies to W.—I. If the resulting clay, after passing the rollers, be dried and rubbed through a sieve, ten-mesh to the inch, there should be no core left on the sieve. This should about do for ordinary bricks. High grade work would possibly work well from a thirteen mesh, and even higher, say a twenty.

II. Much depends on the nature of the material, and the time you are prepared to give in burning the same ; together with the particular standard of excellence you wish to attain, and the amount of heat, not only necessary for the wares under discussion, but the amount the goods will stand. You would do well in giving ten hours' soaking for a start, and note results ; the body should, if properly burned, be of the same degree of hardness, and the same colour, throughout its mass. It would mean a waste of time, fuel, and money, to carry the soaking through any longer period than is necessary to bring the wares to the foregoing conditions. But even then glazed wares may not allow this treatment without spoiling the glaze. These remarks are more particularly directed to dry, unglazed wares.

III. Lime may be present in such proportions as to give many varying effects in connection with iron, silica, and alumina, present in the clay. Everything turns on the relative quantities or proportions of the constituents present in the clay. Under one set of conditions, a given quantity of lime will knit the body more closely together, rendering the body more vitreous. Under another set of conditions, the lime may render the original body less vitreous. Or it may form compounds which would disturb the stability of the brick by abnormal expansion. And, lastly, it may be present in such quantity that, after exposure to the air, the wares would simply crumble away. Speaking generally, the presence of lime is more likely to disturb, or affect, the cohesion of the particles comprising the brick, than to give trouble in the burning; but there are exceptions.

Scum !—There is hardly a naturally occurring clay that will not show efflorescence, more or less pronounced in character, on its exposed surfaces, during the drying or burning. This will occur with the purest and best clays, as with the most common varieties. Washing, with pure and clean water, will do much towards getting over the difficulty; but provided the surfaces of the wares are not covered by any slips or vitreous glaze, and the wares are burned dry—with free admission of air—some sort of "Scum" will generally be found on the exposed surfaces of the wares. It is a peculiarity of most soluble salts that they work out from insoluble surroundings. This is true of certain soluble salts of calcium, magnesium, sodium and potassium; as may be proved by the addition of the same to a good red clay—such a clay being the most suitable for effect—and noting the result. Generally speaking, soluble salts contain water of crystallisation; water in some sort of chemical combination, in definite quantity; even as that contained in the clay substance, and requires a strong heat for its expulsion Under certain physical conditions many salts are soluble in their own water of crystallisation: notably under the influence of heat. One's wares may be never so dry before entering the kiln, but the quantity of combined water to be expelled in the burning is very considerable, quite sufficient to carry any soluble salts to the surfaces of the wares. Reduction is always unfavourable for the development of scum, and for our part, we should burn such wares in as high a reducing atmosphere as the wares and colour would stand in preference to the use of reducing mediums—as instanced by tar.

The working principle of all anti-scum mixtures turns upon the question of solubility: the conversion of soluble sulphates mainly, into insoluble salts. And it is in all probability, at the steaming stage, particularly in the case of soluble sulphates with their attached water, that their conversion into insoluble sulphates is best effected. However, it is obvious that the foregoing principle is somewhat limited in its application; sulphur, and that in the form of a sulphate, must be present for the conversion; but, unfortunately, there are other soluble salts that will scum, not necessarily containing sulphur.

Covered Kilns.—Kilns, whenever practicable, should always be covered. A good drying floor can generally be built, with advantage, over a kiln—similar to your sketch, which seems to be about the right thing. But in no case build *on* the kiln; neither take any supports for your superstructure from off the top or sides of the kiln. Let the columns and girders stand apart, independently of the kiln itself; leaving sufficient room to get to any part of the kiln during burning, or other working operations, or for repairs.

Bankruptcy Proceedings.—The debtor, Joseph Tappin, was described as a timber and brick merchant, of Hill-house, the Hill, Ilford, and also of Rayleigh, Essex, and this was a sitting for public examination. The statement of affairs showed liabilities £19,807, of which £3,418 were unsecured, and assets £831. It appeared that the debtor commenced business as a timber merchant in 1893, without capital, and he had also been interested in building operations. He attributed his failure to bad debts (£1,000); to law costs (£1,500); and to pressure by creditors during the last six or seven months. The examination was adjourned to enable the debtor to furnish further accounts.

TRADE NOTES.

The Portuguese have imposed an import duty of £1 per thousand on bricks made in British Central Africa.

Lead Poisoning.—A Home Office return shows that 98 cases of lead poisoning were reported during July, 85 of males and 13 of females, the figures for the corresponding period of last year being 95 males and 36 females. Of the 98 cases 38 were set down to leadworkers, and 14 to workers in the china and earthenware trades, as against 31 and 57 respectively last year. Five cases, including that of one female, ended fatally.

New Brickworks at Blyth.—New brickworks, on an extensive scale, were commenced at Blyth, on August 28th, by the Albion Brick Company, Limited, to work what is believed to be a valuable royalty of clay on the outskirts of Blyth, near the Cowpen Colliery. The royalty comprises 20 acres, leased from the Thornton and Croft trustees, and the seam of clay, which is 20ft. thick, and of good quality, lies only a few inches from the surface. The works are equipped to produce a daily output of about 20,000 bricks.

A Brickmakers' Church.—The Bishop of Lichfield recently dedicated the Church of the Good Shepherd at Church bridge, in the parish of Langley, near Oldbury. The church is a plain but substantial building of brick, the materials having been given chiefly by Messrs. Wood and Ivery, while several other brickmasters gave 5,000 bricks each. It will accommodate 320 persons, and the cost, including the site, is about £2,500. There have been a number of gifts to the church, the cloth for the holy table and the communion linen having been presented by Mrs. E. and the Misses Webster.

Sales of Brick Properties.—Essex.—The brickfield at Billericay, advertised in our last issue, was sold by Messrs. G. B. Hilliard and Son, of Chelmsford, for £850. Cambridgeshire.—The Horningsea and Fen Ditton property brought together a crowded audience, and the biddings started at £2,000, rising to £3,675, at which price the property was sold to Mr. Geo. Clarke. The price paid was about £45 per acre, which was looked upon as satisfactory, considering the present depression in land. Messrs. A. M. Robinson and Son were the Auctioneers, and Messrs. Francis, Francis and Collin represented the Vendors.

Death of a Yorkshire Brick Manufacturer.—Mr. Richard Graves, who formerly owned and worked the Gillhead Colliery and Firebrick Works, Flimby, died at Maryport recently. He had a talent for mechanics, and took out patents for several labour-saving machines, which are in use at many collieries. He was a Conservative in politics, in which he took much interest, and served as a Parish and District Councillor and as a member of the Flimby School Board. He was 45 years of age, and leaves a family of five daughters.

Brickmaking at Horncastle.—Brickmaking by machinery is a new industry so far as Horncastle is concerned, and during the past few weeks many people have paid a visit of inspection to Mr. Boulton's brickyard, where Mr. Harrison, of Norman Street, Lincoln, has put down new machinery and is busily engaged in turning out large numbers of bricks. The machinery is capable of making about 700 or 800 bricks per hour, the clay, &c., being ground and prepared in one operation. Not the least interesting portion of the machinery is the hauling apparatus, by which the clay is carried to the top of the pit in a trolley running on wire ropes, and deposited on a platform erected over the brickmaking machine. Already a large number of bricks have been manufactured, and as there is an almost inexhaustible supply of clay, the output is likely to be very large indeed.

COMPANIES' MEETINGS.

Joseph Robinson & Co.—The report of the directors of Joseph Robinson & Co., Limited, cement manufacturers, Carlisle, Whitehaven, London, &c., shows that the trading profit for the past year was £8,583, as compared with £7,980 the year before. The London business is rapidly increasing, but there is still a loss at Whitehaven. The directors recommend a dividend of 6 per cent., leaving a balance of £3,216 to carry forward, as compared with £1,690 balance brought forward last year. The works, plant, goodwill and patents are valued at £83,000, and the total assets are put at £103,163.

Lowood (J. Grayson) and Co., Limited.—The annual meeting of this company was held recently at Sheffield, Mr. Grayson Lowood in the chair. The report showed a balance of profit of £3,590, but the directors were of opinion that in some cases stocks had been overvalued, and decided not to pay any dividend for the past year. The chairman moved the adoption of the report, and said the company had large orders for all classes of goods with the exception of ground ganister, in which there was a falling off owing to a change in the manufacture of steel by the substitution of the open-hearth system for the Bessemer process. After some discussion, it was agreed to hold over the adoption of the report for three months, pending a re-valuation.

Webster's Brickworks, Coventry.—The following is a copy of the report to be presented to the shareholders at the second annual meeting :—" The directors have pleasure in presenting to the shareholders the accounts and balance-sheet of the affairs of the company on June 30th, 1899. The profits on trading for the period covered by the accounts (fourteen months, from the 1st of May, 1898, to 30th June, 1899) amount to £4,193 15s. ; and, after providing for depreciation and renewals to plant, machinery, horses, carts, &c., directors' fees, debenture interest and reserve for bad and doubtful debts, there remains a balance of £1,733 15s., which your directors recommend should be applied as follows : In payment of four per cent., less income tax, £1,475 18s. ; in writing off one-half of preliminary expenses, £129 13s. 11d. ; balance to be carried forward to next year's account, £28 3s. 1d. When the directors last met the shareholders it was thought that the extensive additions that were then being made to kilns and machinery would very soon be concluded. Owing, however, to unforeseen circumstances, the completion of these extensions was considerably delayed, and the first half of the trading period now under review had run by before the company were in a position to reap the benefit of these latest extensions. During the latter part of the year the demand for bricks in Coventry fluctuated very considerably, and the market price gradually declined. These considerations have considerably affected the amount of profits, but the company was successful in meeting competition, and the selling prices have been latterly improved, so that the directors are satisfied with the position of the company. The shareholders are to-day in possession of some of the largest and best equipped brickworks in the district, and your directors are unanimously of opinion that the time has now come for the company to cease to be dependent upon Coventry, and to lay itself out for a share of the ever-increasing demand in the London and Birmingham markets. So soon as the company is in a position to do this, the board believes that large profits will accrue to the shareholders. With this in view, it is proposed to connect the works with the railway. Your directors have already taken the preliminary steps, are making arrangements with the London and North-Western Railway Company, have obtained the requisite sanction from the various local authorities, and had plans, specifications, and estimates prepared, as it is highly desirable in the interests of the company that the work should be proceeded with without delay. Your directors have to report that with the above object they have recently acquired the brickworks of Mr. C. Gray Hill, upon terms which they consider most satisfactory to the company. These works adjoined those of the company, and have a frontage to the proposed line of railway. Not only do the directors consider the acquisition of this business of very great advantage to the company, but in view of the one company now leasing the two brickworks the directors have been able to arrange with the landlord, the Hon. Cecil S. Irby, for an extension of the lease from thirty to fifty years. This concession materially strengthens the position of the company.

NEW COMPANIES.

Coke, Clay, and Chalk Syndicate, Ltd.—Capital £5,000, in £1 shares. To carry on the business of coke makers, chalk quarrymen, etc., and to adopt an agreement with W. F. M. Williams. Registered office, 20, Great St. Helens, E.C.

Anglo-Canadian Gold Estates, Limited.—Capital £61,000, in £1 shares. To acquire freehold and other farms, and to carry on the business of farmers, brickmakers, builders, etc. Registered office, 9-10, Pancras Lane, E.C.

T. A. Simpson & Co., Limited.—Capital £2,000, in £1 shares. To acquire the business carried on at Cliff Bank Works, Stoke-on-Trent, as tile manufacturers, &c. Registered without articles of association. Registered office : Cliff Bank Works, High-street, Stoke-on-Trent.

Exeter Brick and Tile Company, Limited.—Capital £10,000 in £5 shares. To carry on the business of brick and tile makers. The first directors are to number not less than three nor more than seven. Qualification, 50 shares. Remuneration, as the company may decide.

New Grantham Brick Company, Ltd.—Capital £7,000, in £1 shares. To adopt an agreement with John W. Martin, for the acquisition of certain brick and tile works in Paper Mill-lane, Grantham, Lincs., and to carry on the business of brick and tile manufacturers, &c.

Chesterfield Brick Company, Ltd.—Capital £3,000, in £1 shares, to acquire the business of the Inkerman Brick Company, and to carry on the business of brick, tile and pipe manufacturers. The number of directors is not to be less than three nor more than seven ; qualification, £25 ; remuneration as fixed by the company.

Edge, Malkin & Co., Ltd.—Capital £35,000, in £1 shares, to acquire the business now carried on at Burslem, Staffordshire, by William M. Edge, William S. M. Edge, and Samuel W. Dean. The first directors are William M. Edge, William S. M. Edge, and Samuel W. Dean. Qualification £1,000. Registered office, Newport Pottery, Burslem.

Wisewood Brick Company, Limited.—Capital £3,000 in £10 shares, to carry on the business of brick, tile, pipe, and terra-cotta manufacturers, dealers in gannister, etc. The first directors (to number not less than two nor more than four) are Frederick A. S. Crawshaw, Arthur T. Bescoby, Frederick U. Laycock, and William Frankish. Qualification, 20 shares.

Higher Antley Brick and Tile Company, Ltd.—Capital £50,000 in £1 shares. To acquire and take over the business now carried on at Accrington, Lancs., under the style of the " Higher Antley Brick and Tile Co.," to enter into an agreement with R. Warner, and to carry on the business of manufacturers of and dealers in bricks, tiles, pipes, pottery, plaster, cement, gypsum, earthenware, china, terra-cotta, artificial stone, &c. The number of directors is not to be less than three nor more than seven. The subscribers are to appoint the first. Qualification, £100. Remuneration, £100 each per annum (an extra £50 for the chairman), and a share in the profits.

The Glengardo Fire-Clay Company, Ltd. — To carry on the business of brickmakers, &c. Capital £4,000, divided into 500 five per cent. preference shares of £1 each, and 3,500 ordinary shares of £1 each. The first subscribers are :—M. B. Baird, steelfounder, Hamilton ; And. Macfarlane, metal merchant, 93, Hope Street, Glasgow ; R. Dobbie, ironfounder, Larbert ; Andrew Hunter, solicitor, Falkirk ; Peter Graham, brick manufacturer, Falkirk ; David Graham, brick manufacturer, Bonnybridge ; and Borthwick Watson, D.L., J.P., Ardfern, Falkirk—each one share. The first directors are the aforesaid M. B. Baird, Andrew Macfarlane, Peter Graham, and David Graham.

London and Arlesey Brick Company, Limited.—Capital £12,000 in £1 shares, to carry on at Arlesey, Beds., and elsewhere the business of brickmakers, etc., and to adopt an agreement with, William Child and Henry Child for the acquisition of a piece of land at Langford. The subscribers are :—J. W. Close, 7, Greek Street, Leeds, accountant ; Alfred B. Blakeley, Holly Royd, Dewsbury, mining engineer ; William Child, Whitkirk, Leeds, Coal Proprietor ; Henry Child, Whitkirk, Leeds, coal proprietor ; Mrs. H. A. Child, Whitkirk, Leeds ; Margaret Blakeley, Holly Royd, Dewsbury ; C. Close, Dagmar Lodge, Leeds, engineer. The number of directors is not to be less than three, nor more than five ; the first are William Child, Henry Child, Alfred B. Blakeley, and James W. Close. Qualification £1,000 ; remuneration as fixed by the company.

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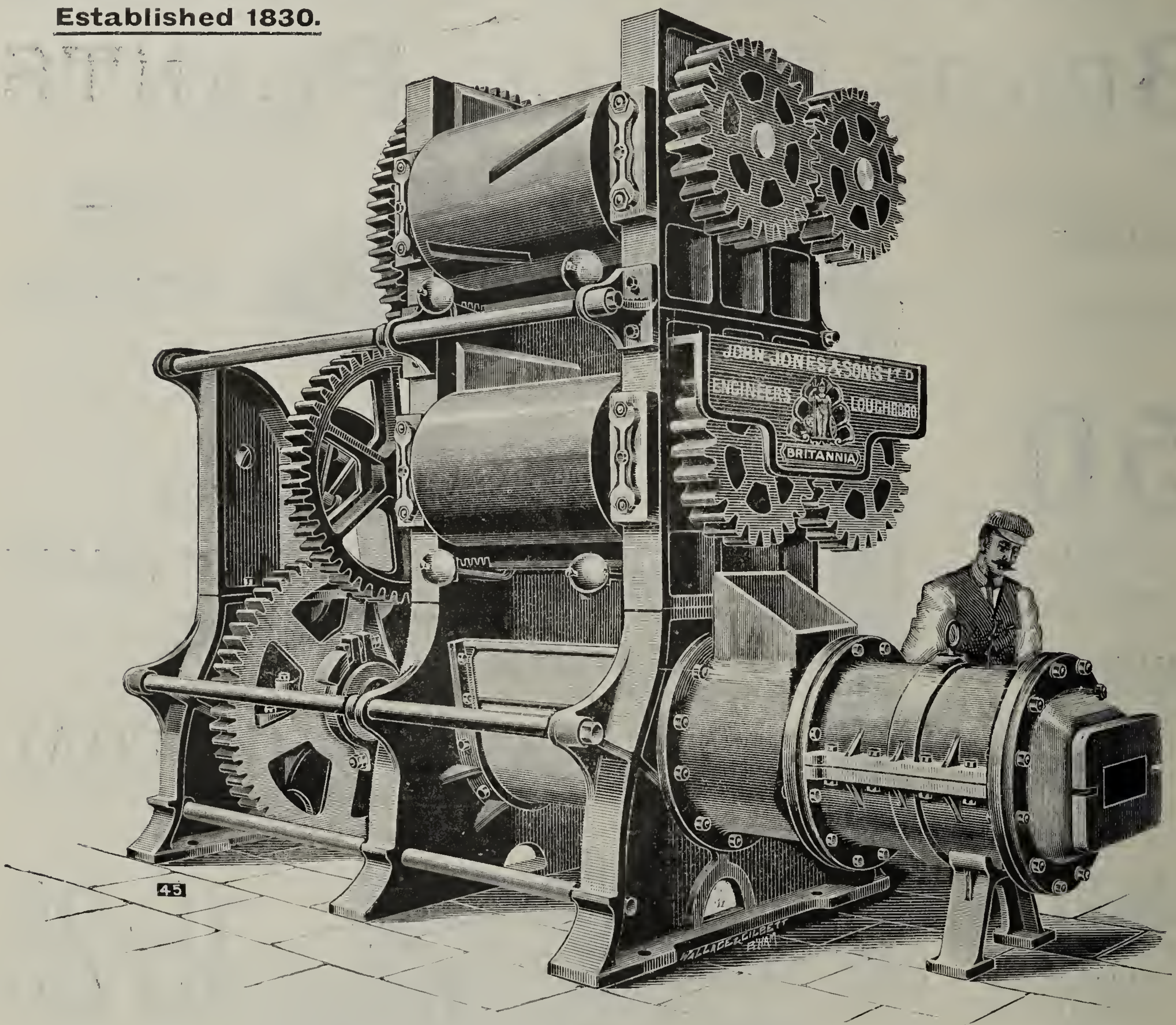

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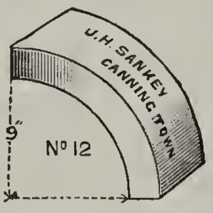

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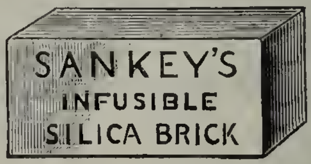

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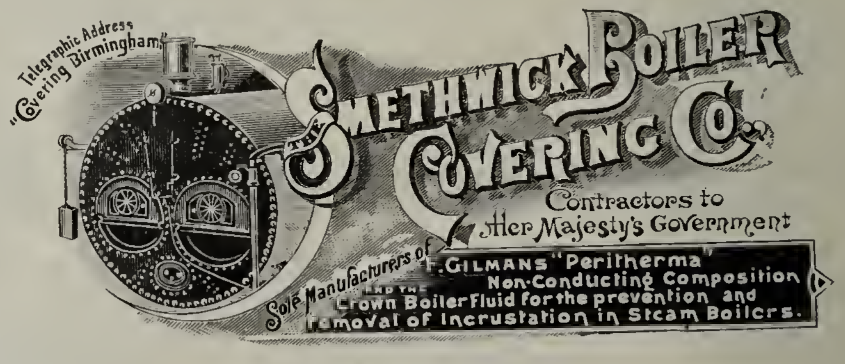
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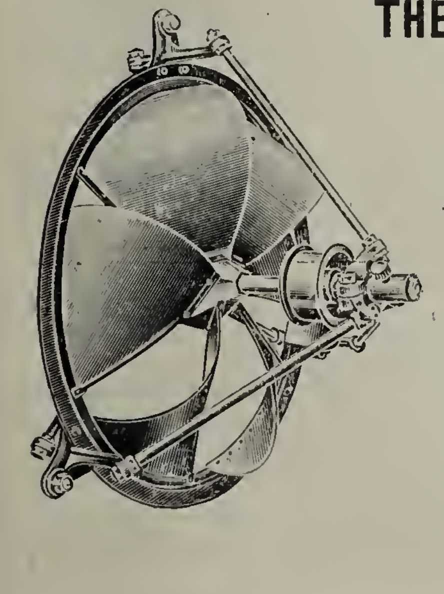

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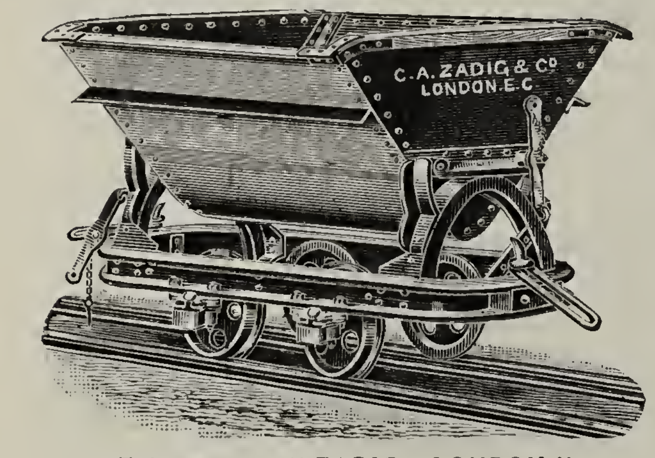

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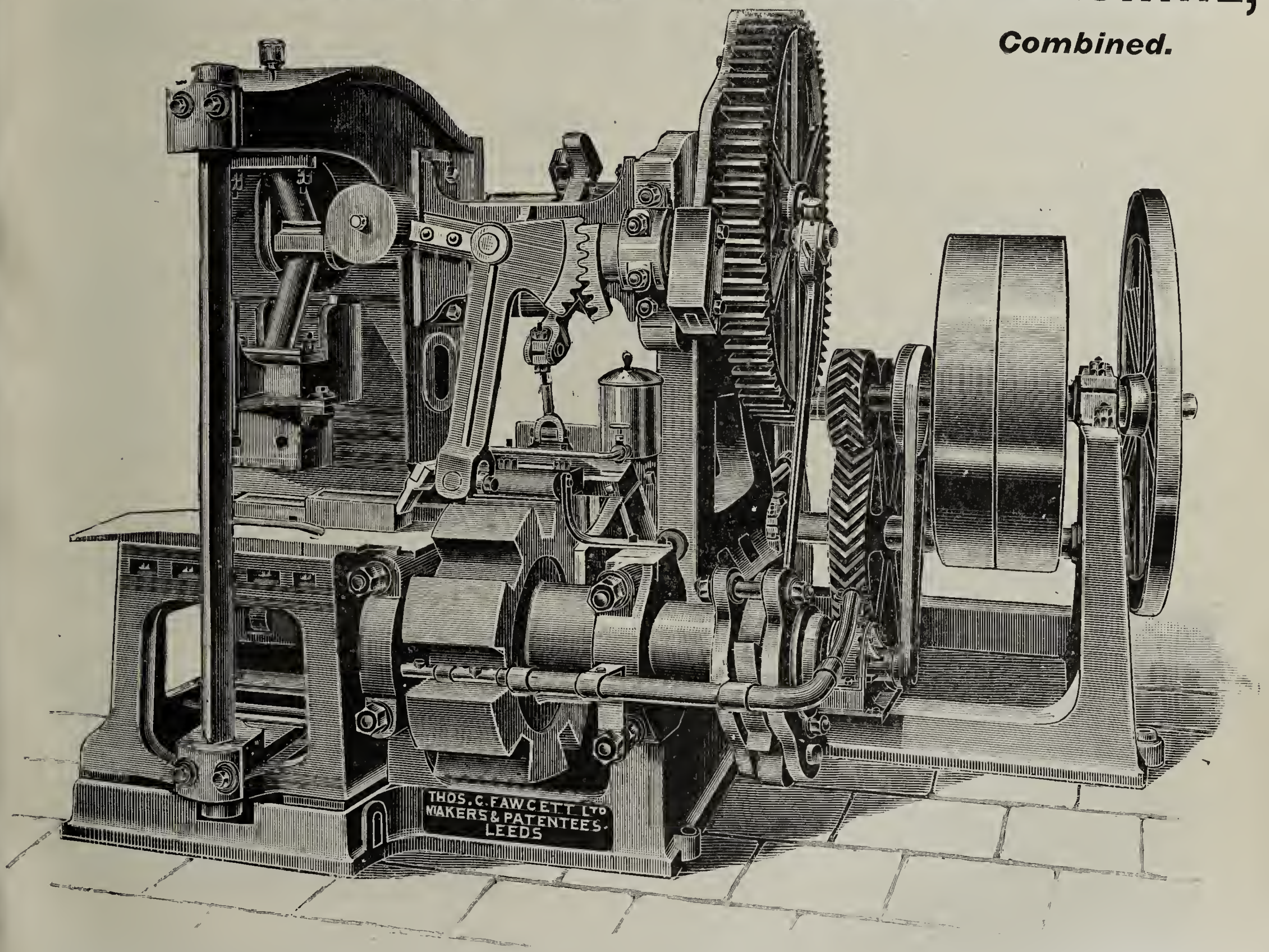

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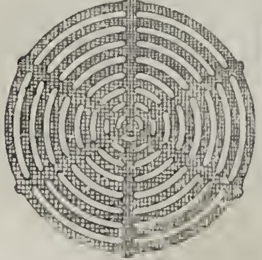

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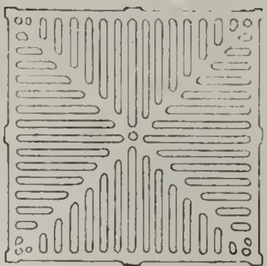

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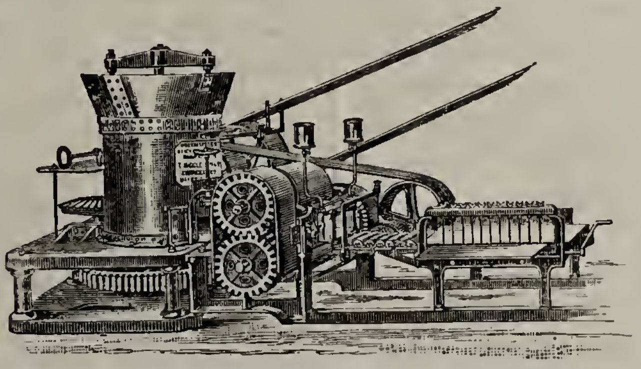

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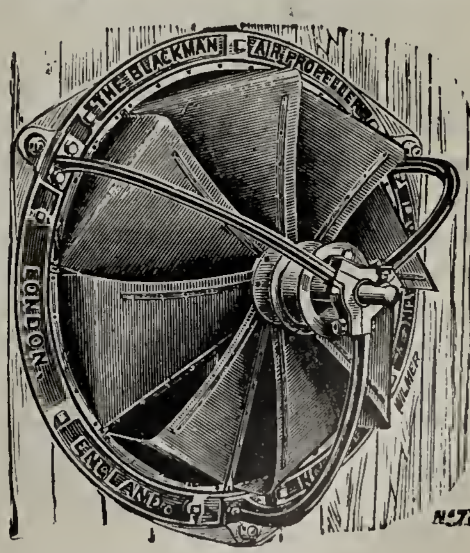

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BY THE WAY.

In order to facilitate the obtaining of managers and foremen by members of the Institute, a list of men requiring situations has now been filed at the offices, and such list will be sent to members upon application to the Secretary. Employers should state fullest particulars concerning the men they wish to engage, and employees should also send full particulars and *copies* of testimonials only. There will be no charge made for bringing employers and employed into touch, and communications will be treated confidentially. No responsibility, however, can be undertaken as to the *boná-fides* of either employer or employee. Appointments may be made at the offices of the Institute.

* * *

Mr. Arthur Koppel is determined to keep green the memory of the trip to Germany, which he did so much to make a success this year. Not content in lavishly entertaining his British guests he must needs order his agent at Havana to send a consignment of cigars to Essex Street. They have been duly sampled, are of exceptional size and flavour, and are at the disposition of members of the trip who care to call at headquarters—within a limited time. Were it not for the fact that 43 is a teetotal house, one might offer with the cigars a glass of fine Scotch whiskey out of a case which our two good friends, Messrs. Mitchell and Waldie, sent to us with which to drink their health and success to the next trip. There is a fine flavour of Scotch humour as well as whiskey about that case !

* * *

There can be no doubt, that in spite of improved appliances, etc., for brickmaking, the percentage of bricks drawn from the kiln which bear cracks is not diminishing in certain districts. During the past month, this question has been placed before us in a very practical way by a large user of bricks (an architect). This query was not how to get rid of the cracks, as he was not a manufacturer, but as to how far they were detrimental in the sense of their more rapidly weathering, than if the same bricks were without the cracks. Our reply was to some extent qualified because we know of several makes of excellent bricks which are not often entirely free from cracks, but, speaking generally, for a well-shaped brick intended for ordinary use, the fewer of these cracks the better.

* * *

It may seem paradoxical, but if the architect must have cracked bricks, the larger the cracks the better. From the point of view of the bricks withstanding the action of the weather, it is the minute hair-like cracks, or even those microscopic in size that are the worst. By a species of capillarity, water is retained in these minute cracks, and it is much more difficult for it to escape, than if contained in the larger cracks from which it may be able to flow, indeed, with comparative ease after a storm. In the case of defective damp courses, also, bricks built internally will "take on" the damp much more readily if the cracks are very small than if they are plainly visible. This is not generally known, but is certainly the fact in practice. The continual dampness leads to the readier disintegration of the brick, and during frost this circumstance is undoubtly emphasised.

A firm in America is said to be turning out large quantities of paper tiles which are used for roofing. They are reported to be hard and tough, and the glazing appears to be of the nature of Japanese lac. They are said to be exceedingly cheap, and can be fashioned in any colour or shape to suit the purchaser. We shall be glad to hear more of these tiles when they have been exposed to the elements for a year or two.

* * *

It is said that they do things generally better in France, but this is certainly not true in respect of the lead poisoning question. Mr. Thomas Oliver's report on the pottery industry in France, just published, is a valuable contribution to the subject. He has found that across the Channel, lead poisoning exists to a lesser extent than in England, but there is more pulmonary disease. The employment of female labour is one of the causes of a high rate of infant mortality. On the whole the French regulations are far inferior to our own, and the means of evading even such as exist are extremely numerous. Children may begin work at twelve years of age, on production of a school and medical certificate. Neither washing appliances nor nail brushes are required by law. The use of fans is not so prevalent as in the large china works in England. Overalls are not universally worn, nor are the employers legally compelled to provide them. Those who wear must wash them. It is forbidden to eat food in the work rooms. Medical inspection of the potteries is rather lax, in one factory the medical visit being made once a week, in another once a month. The dangerous processes, however, are fewer. The lead is fritted, and is in the form of a silicate or boro-silicate, while there is a much smaller quantity of lead used than in Britain. When required it is used more sparingly, and usually in the more insoluble forms. Hence there are fewer cases of plumbism. We hear a great deal about lead poisoning at home—the laxity of officials and the indifference of the State, but the English potter has to be thankful that he is not even as his French brethren.

* * *

Here is a Consular story in explanation of the fact that the British trade in cement with California only increased about 24 per cent. last year, while the German trade increased by 33 per cent., and the Belgian 48 per cent. Consul-General Pickersgill says : Several years ago one of the largest dealers in cement here discovered that a new quality of cement had been introduced from the Continent of Europe, and that it was meeting with the approval of consumers, on account of its greater fineness and somewhat lower price. It was to the advantage and convenience of this merchant to continue to take his supplies from England, his firm having its only European establishment there. He therefore notified the manufacturer of the danger to their joint interests, and recommended them to sift with a finer mesh and modify their price a little. Failing to make any impression by letter, he crossed the Atlantic and laid the state of affairs before them personally. But they remained, notwithstanding all his efforts, perfectly convinced that they were making as fine a cement as the world had any need of, and that it was good value for the money they asked. So, like a prudent man of business, he carried his firm's patronage elsewhere and is now importing from Germany only. When this bit of commercial history was related to me, it evoked the following comment from a neighbour, "It is your manufacturers you Britishers want to educate rather than your merchants," and I reminded myself that I have now been, as a Consular representative, in three countries in which I have seen importers transfer custom to the Continent of Europe because the producers of the United Kingdom are too slow in adapting their goods to changing markets.

THE BRICK-EARTHS OF GREAT BRITAIN.—XXVII.

The Lincolnshire Oolite and the Great Oolite Limestones in the district are both suitable for mixing with the clays to produce different tints, but we are not aware that they are so employed at present. The Upper Estuarine Clay does not differ from that in the Wansford district already described, and is unimportant so far as the Uppingham area is concerned. The Alluvium here is, for the most part, of a heterogeneous character, consisting of the remains of the ferruginous Northampton Sand, and the two Oolite limestones mentioned, together with clays derived from the Upper Estuarine Series, but principally from the Upper Lias. It could be used for brickmaking, but is not of the same quality as the Lias Clays mentioned as being so abundant in the Uppingham district.

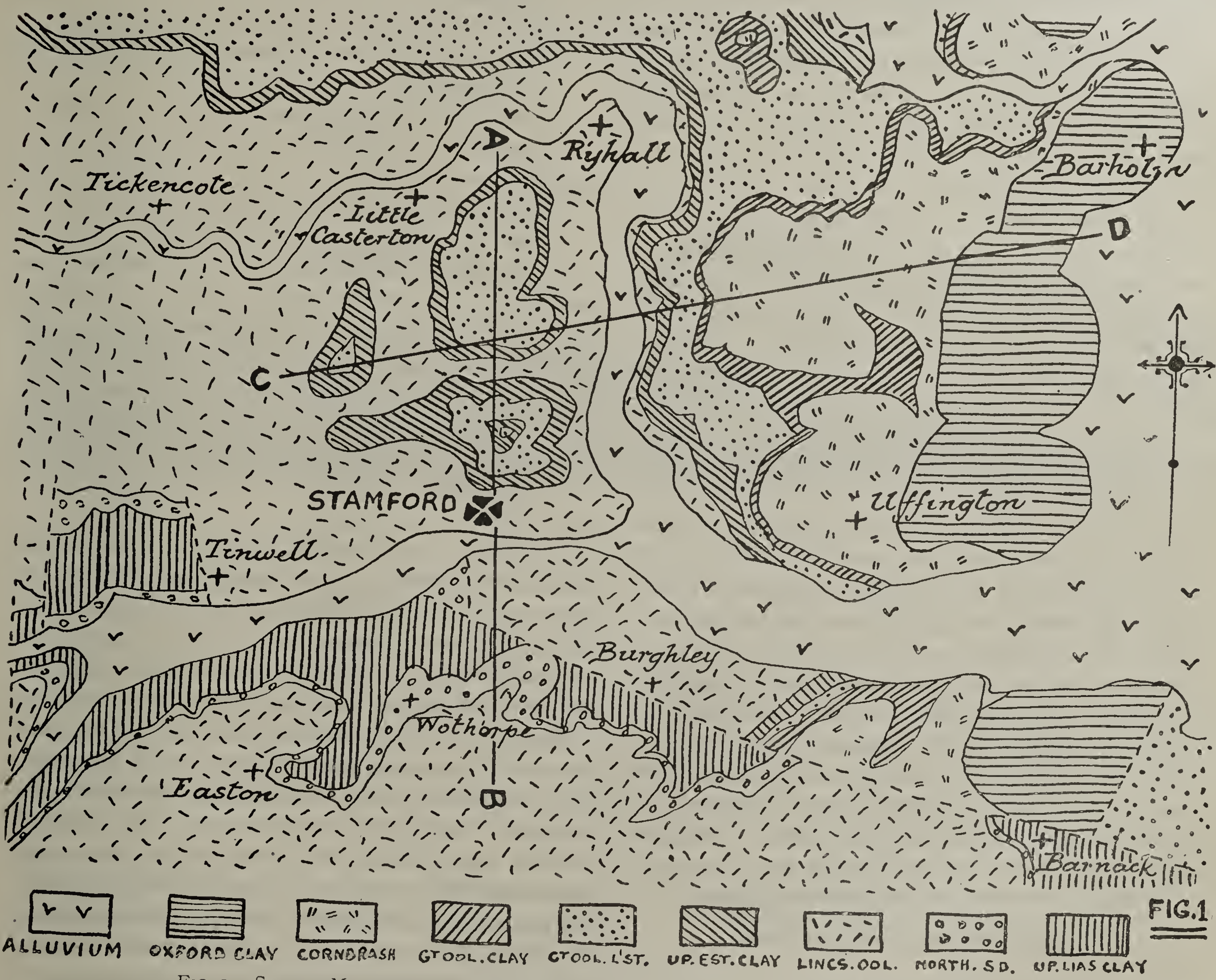


FIG. 1

Fig. 1.—Sketch Map shewing distribution of Brick-earths in the Stamford District.

Stamford District.

No fewer than nine distinct formations crop out at the surface, within a few miles of Stamford. This is partly due to the influence of the great fault which brings up the Upper Lias clay to the south of the town. The position of this fault may be readily traced by the broken line running approximately east and west in our sketch map (Fig. 1). It throws the Lias against the Lincolnshire Oolite limestone in the grounds of Burghley House, and brings the Northampton Sand to the surface. We may now describe the beds in proper order, commencing with the—

Alluvium.—This is deposited not only in the valley of the river Welland, but in that of its tributary, the river Wash. It consists principally of gravel, though to the south-west of Stamford is a true silt, and the same earth occurs in some thickness in the river Wash above Ryhall. Silt is also well represented along the valley of the river Glen, whilst silty peat occurs in abundance on the flats of the fen country in the neighbourhood of Barholm. We are not aware that these superficial deposits are anywhere used for brickmaking in the district, and, in general, they are unsuitable for that purpose. In the vicinity of Tinwell, however, the alluvium would make a fairly good sand brick, though it would possibly not be able to successfully compete with the beds of the Upper Lias hard by.

Oxford Clay. — This is the principal brick-making formation in the district, and, indeed, is quite as good in quality as that at Peterborough, not far off. It has the misfortune, however, to be covered over to a large extent by a thick deposit of superficial beds, so much so that its boundary on the east of the district, at Barholm and southwards, is ill defined. Near Uppington it is at the surface and is readily exploited in deep open pits. It is very thick just to the east of that village. Oxford Clay appears to constitute the substratum of that portion of the Fens in the east of our district. The process of claying the land (that is, digging deep trenches through the superficial peat and silt into the clay-beds below, and spreading portions of these latter over the surface), occasionally affords fair exposures of these deep-blue Oxfordian clays. We use the term clays, because we have included the Kellaways beds in the Oxfordian on the sketch-map (Fig. 1.) The brickyards at Uppington really derive their earths from the Kellaways division. Professor Judd says that it is reported that this division yields better bricks than the true Oxfordian, and they stand heat remarkably well. The beds are more sandy than the Oxfordian. We shall not give a sketch-map showing the distribution of the various brick-earths south of Bourne; and as this area is only a few miles to the south of the Stamford district, we may allude to it now. The Oxfordian beds are exceedingly well developed at Bourn, Thurlby, and near Baston. At Kate's Bridge the Kellaways are only about 6ft. in thickness, but have been employed for brickmaking for many years. The formation consists of light-blue sandy clay. A brickyard section at Bourn may be cited as giving some idea of the great range of materials available from the Oxfordian :—

Brickyard Section at Bourn, Lincolnshire.

		ft.	in.
Soil	...	1	6
Clay, becoming sandy and yellow below	...	1	6
Light blue and yellow mottled sand ...	...	2	0
Light coloured laminated clay	...	2	6
Sandy rock (irregular)	...	4	0
Light blue clay	say	9	0
Cornbrash beneath.			

This is almost an ideal section for making good bricks, and it is not to be wondered at that this fact should have been known and taken advantage of many years ago.

Approaching the town of Stamford a little nearer, it will be well to give some idea of the divisions or formations locally represented. The town is situated on either side of the river Welland, that portion on the north rising into the high ground or plateau, known as Stamford Field. From the level of the Welland to this plateau there is a rise of about 200ft. vertical, made up of the following beds in descending order :—

Cornbrash.—Just a capping on the summit of the hill.
Great Oolite Clay.—Not exposed in any section, or brickyard.
Great Oolite Limestone.—Base only seen.
Upper Estuarine Series.—Exposed in brickyard sections especially.
Lincolnshire Limestone.—Seen in several quarries in the district.
Lower Estuarine Series.—Visible at a few points.
Northampton Sand.—Principally ironstone and sand.
Upper Lias Clay.—A few feet exposed.

The dislocation on the southern side of the Welland valley (*see* Fig. 1 and Sections Figs. 2 and 3) has had the general effect of dividing the Inferior Oolite beds of St. Martin's from those at the top of the hill on the London road, a mass of Upper Lias being wedged in between them. This effect may also be well observed on ascending the hill towards Lord Exeter's old ironstone quarries.

To proceed with the description of the several formations represented :—

Cornbrash.—This formation presents several well-marked characteristics which it retains throughout a great part of England. It is of little consequence to the brickmaker, and in the Stamford district does not often surpass 10 to 12ft. in thickness. In general it is a ferruginous limestone, and, when dug under a considerable thickness of clay, is of a blue colour. When weathered at the surface, it breaks up into tabular masses of light-brown tint, each of the masses being commonly coated with calcium carbonate in a stalagmitic form. Some beds are sandier. The Cornbrash is much sought after in the Stamford area as a road metal, and occasionally is burnt into lime. Where the fat clays cropping out in the vicinity are employed for brickmaking, the sandier portions of this calcareous formation might be used as lightening the clays, but this hard stone takes a lot of grinding, and the Lincolnshire Oolite close by would generally be preferred.

The *Great Oolite Clay* not being exposed in any sections except on the high ground to the east of Stamford, and there not well, has led to the belief that the material is not of much use to the brickmaker. That is a great mistake, and though brickmaking may for some time continue under a cloud in the Stamford area, owing to the proximity of

FIG. 2.

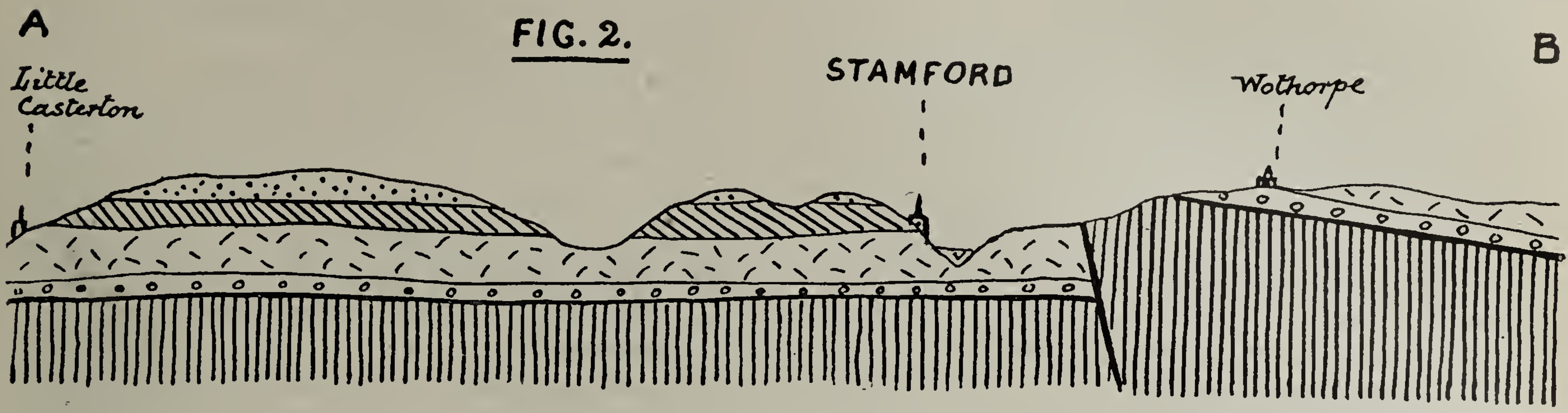
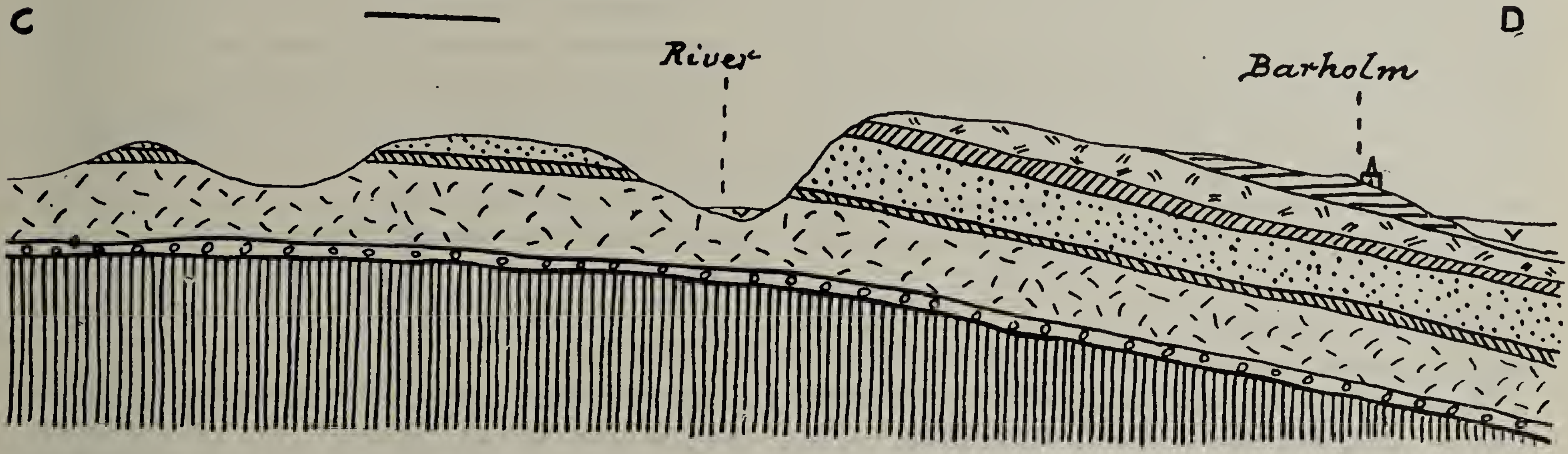


FIG. 3.



Figs. 2 and 3.—Sections along the Lines AB, CD, in Fig. 1. (N.B.—The symbols denoting formations are the same as in Fig. 1.)

several valuable building stones raised from the Lincolnshire Oolite, the time may come when these little exposed clays (*see* map, fig. 1) will attract some attention. It should be borne in mind that for years the Great Oolite clay has been used for brickmaking at New England, near Peterborough, as well as at Bedford Purlieus, and though the Oxford clay has in recent years come more to the front in the former district as material for brickmaking, the Great Oolite clays ought not to be forgotten. Of course, they are not so thick as the Oxford clay, still they run up to 25ft. and 30ft., and that is plenty to go on with. Speaking generally, the Great Oolite clays are a series of variegated blue, green, yellow and purplish clays, often containing bands of irregular whitish or pale-green calcareous concretions, and, not unfrequently ironstone in the form of septaria, or in brach-like concretions. On our map they crop out only on the high ground to the east of Stamford, across the valley of the river Wash, where they closely follow the outcrop of the Cornbrash, and are spread well over the surface to the east of Uffington Lodge. Southwards from that point, towards the village of Uffington, these clays are much covered over by drift, through which it would certainly not pay to penetrate for brickmaking purposes. On the southern bank of the Welland, however, the Great Oolite clays crop out, for about half a square mile near Pilsgate Lodge, near the railway station.

Great Oolite Limestone.—This formation exposed on the higher ground to the north and east of Stamford, is of little or no use to the brickmaker.

Upper Estuarine Series.—The general character of this formation, in the neighbourhood of Stamford, may be judged from the following section of the old Torkington's pit measured by Professor Judd :—

Torkington's Old Pit, Stamford.

	ft.	in.
1. Soil	1	6
2. Oyster beds of the Great Oolite limestone	3	0
3. Dark-coloured, nearly black, carbonaceous and ferruginous clay, without shells ...	3	6
4. Grey clays, with shells	3	0
5. Clays of a tea-green colour, sometimes passing into bright green, crowded with shells	5	6
6. Black, carbonaceous bed	2	0

	ft.	in.
7. Green clay, with masses of jet	2	0
8. "Skerry," a hard gritty clay formerly used for making fire-bricks. It resembles in texture the "root-beds," but has no vertical plant remains	0	8
9. Grey clay, blackish in places. This had the reputation of making the finest white bricks, and was esteemed the best clay in the pit	4	0
10. White clays, very sandy in places	5	0
11. Light reddish-brown clay, full of wood ...	1	0
12. Ironstone junction-band	1	0
13. Lincolnshire Oolite limestone	74	0
14. Sands and ironstone of the Northampton sand	few feet seen.	

This pit was in full swing in 1869, and has since been closed; but it is seven years since we were on the spot, and it may have been wholly or partly re-opened. We quote the particulars of the section as showing the excellent nature of the clays, &c., met with, and the information is largely applicable to the whole Stamford district. Bed No. 8 contains rather more iron pyrites than is desirable in an ideal clay for making fire-bricks. The upper clays burn into a red brick.

The Upper Estuarine Series are also well exposed, though not in the same detail as in the old pit mentioned, at Ketton, where it is passed through to get at the famous building stone underneath; also at the well-known Clipsham quarries. In the quarries at Little Casterton the junction of the clays at the base of the Great Oolite series was well seen at the time of our visit. There were several feet of the ironstone junction band, and that is overlaid by the white clays so persistent in the area. In the same locality several pits, now more or less overgrown, yielded good sections in these clay beds.

An enormous quantity of bricks has been made at Little Bytham, on the railway line some nine miles north of Stamford from the clays of the Upper Estuarine Series. (This locality is about five miles north of the village of Ryhall, shown on our sketch map.) Professor Judd, in noting the section presently to be described, remarks that the bricks made at Little Bytham are of peculiarly excellent quality, which, from the ringing sound which they give when struck together are known as "clinker bricks."

Section at Adamantine Clinker Works, Little Bytham.

	ft.	in.
1. Soil	0	6
2. Tea-green clays	1	2
3. Brown sandy clay	1	0
4. Greenish clay, full of soft, white, carbonate of lime	1	0
5. Variegated blue and brown sandy clay ...	1	6
6. Blue clay	0	6
7. Blue and brown sandy clay, similar to No. 5	1	6
8. Bed of indurated sand	0	6
9. Blue clay, slightly mottled	0	4
10. Brown and blue mottled, stiff clay, with "race"	0	4
11. Tea-green clay, ferruginous at base ...	1	0
12. Dull tea-green clays	1	0
13. Lighter-coloured tea-green clays, with seams of comminuted shells, and carbonaceous markings	2	0
14. Brown sand, full of shells, and containing carbonaceous markings	0	1
15. Black clay	1	3
16. Lighter-coloured and more compact clay...	0	7
17. Greenish, compact clay, with ferruginous markings	1	2
18. Tea-green clays, with ferruginous markings	0	3
19. Dark-blue, compact clay, ferruginous ...	1	6
20. The same, but becoming more ferruginous at base	5	2
21. Brown, ferruginous clay	1	6
22. Rubbly limestone (Lincolnshire Oolite).		

Lincolnshire Oolite Limestone.—This formation is developed in the Stamford district, is not of much interest to the brickmakers.

Lower Estuarine Series.—This is exposed at very few localities in the district. Taken together with the—

Northampton Sand is exhibited in an interesting section in a railway cutting at Stamford station, on the Midland and L. & N. W. Railways. The Lincolnshire Oolite lying on top of the light-blue and white clays of the Lower Estuarine Series, and these on the ferruginous sands and ironstone of the Northampton Sand are faulted against the Lincolnshire Oolite, the underlying beds on one side of the fault being thrown down out of sight, below the level of the rails.

After what we have said in previous articles, it will not be difficult to understand why under favourable circumstances, such as the above, certain clays laid down in fresh water, or in estuaries, are to be preferred in certain branches of the clayworking industry. We should be sorry to lay it down as a rule, for the evidence available perhaps hardly warrants quite such a sweeping assertion as we are about to make, but it would certainly appear that as the clays of the Upper Estuarine Series are traced northwards from, say the neighbourhood of Achurch and Oundle through Nassington, Wansford, Ufford, Stamford, Essendine and Careby to Little Bytham and onwards, they improve in quality for brickmaking, or rather a large variety of excellent bricks may be made along that outcrop from south to north, culminating a little to the northwards of the last-mentioned locality.

SOME ESSENTIALS OF SUCCESSFUL POTTERY WORKING.—II.

It is commonly found that a clay may, so far as its chemical composition is concerned, be eminently suitable for ware of a given character; though difficult of manipulation. Excessive shrinkage may exist on the one hand, accompanied by reekiness and distortion; or on the other hand, the shrinkage may be so slight, and the power of cohesion, between the particles, so small, that it would be a matter of difficulty to get the body to hold together; that is, before burning. Indeed, the difficulty in this direction often extends beyond that stage. Clays of the former type are generally fine in grain, and both take up and give off water slowly. This is noticeable in the mixing, soaking, and preparation of the material, and in the drying of the finished wares; it is also noticeable in connection with the expulsion of the combined water in the ultimate burning of such clays. Clays falling under the second type, previously referred to, are generally coarse in grain and open; taking up water with avidity which, in turn, is as readily expelled at all stages. These fundamental differences in the physical properties of clays should be even more closely watched by the potter, and by clayworkers generally, than the actual chemical composition of the materials themselves. It is upon the correct understanding and due observance of these properties, coupled with sound judgment in dealing with the same, that the successful working of any pottery or clayworking establishment, worthy of the name, practically turns.

Unfortunately the subject, from it very complexity, will admit of no fixed and definite rules for the clayworkers guidance. No two clays are alike; there are some three hundred and fifty distinct varieties peculiar to the British Isles, to say nothing of those further afield. Each clay, of course, having properties, where they are fully known, peculiar to itself. Hence the combinations possible may not be imagined, let alone described. Some attempts have been made for the classification of the better known varieties; but such classifications are purely arbitrary: there is no sharp line of demarcation in connection with the same; one series merges imperceptibly into another Difficulties must be met as they arise, and though no definite rules may be given to apply in particular, much may be said in general which, in the intelligent application of the same, must go far towards their solution.

Taking the two extremes in clays mentioned in the earlier part of this paper, it is obvious that clays of either type are useless as they stand, if used alone for the manufacture of pottery. However, by careful blending and mixing, much may be done; a body may be obtained having properties and qualities falling at any given point between the extremes mentioned: a body suitable to almost any end desired. *But the soaking must be complete and the mixing thorough.* This latter point cannot be too strongly insisted upon. Clays that are fat, fine in grain, and dense, having a heavy shrinkage withal—particularly those rich in alkalis—occasion more loss, both indirectly and directly, in the working of a pottery, by the neglect of these principles, than most clayworkers are aware of. Hence the insistence of the importance of these preliminary operations. Many and varied, not to say wonderful, are the methods employed in some clayworking establishments that could be mentioned in the preparation of their clays; plain and mixed. It is often surprising how the losses are so cheerfully borne. Indeed, it is only the certain brief intervals of respite, when say stunting, fire or sand cracks, mysteriously disappear for a period: as often as not due to the fact that more care had been taken, sometimes quite unintentionally, in the preparation of the materials—that renders the continuance of many clayworking establishments possible.

The use of any one clay for the purposes of general Potting, even should the clay be of the best, and easy of manipulation, is outside the scope of practical work. The many variations in size, thickness, and in the shape of the finished wares; to say nothing of the uses of the same in the arts, together with the properties and qualities such uses imply, all render such a course impossible. There are also considerations from quite another point of view: from a decorative standpoint; as connected with the glaze or ornamentation. But as regards the latter, this paper is not immediately concerned. The selling price of the wares has also an important bearing on the question; though not equal in importance to the considerations previously referred to. In the case of a dense and highly plastic clay, with a heavy shrinkage, the addition of burnt clay, flint, or sand, in given size and proportion, is in all cases necessary. Such clays generally work up well with from one-fourth to equal weights of the same, alone or combined; in accordance with the state of division of the burnt clay, flint, or sand, which may pass any sieve falling between a twelve or an eighty mesh to the inch. The finer the state of division of these latter materials, the more the clay will take up. Then again, should the clay be rich in alkalis: burning too vitreous for the work, some further addition in the way of a more dry and open clay is recommended, The whole being governed by considerations turning upon the manipulative qualities of the material, the size and general properties of the wares, and the uses to which the finished wares are to be put. The correct working proportions and size of the materials are easily arrived at, by attention to the following points, as determined by direct experiment with the clays at hand.

A perfect body, carefully prepared, the component parts being well mixed, soaked, and the whole thoroughly pugged, the sample, after drying and burning under normal conditions, should show no signs of distortion, reekiness or cracks; the power of absorption should be low, and the body tough and homogeneous throughout its mass. In speaking of cracks, glaze crazing is not here referred to; so called sand and fire cracks are of course included; but something similar to glaze crazing in effect: a network of fine cracks mapped over the exposed surfaces of the dry-burned wares. These cracks are generally associated with highly plastic clays: clays shrinking some 18 per cent. in bulk from the soft and plastic condition, up to and including the ultimate burning, used in conjunction with large sand or rough stuff—*i.e.*, large rough pieces of ground pottery, from which the small cracks are generally found radiating in all directions. In a properly adjusted body these cracks should not be visible, even under a good glass. This definition as to the essential qualities of a good body holds good for practically every purpose for which clay-wares can and may be applied in all the arts and manufactures.

Strictly speaking, in a mixture wherein two or three clays are blended together, whose respective shrinkages are somewhat widely apart, the clays should be present in such proportions that the force exerted in their contraction would be rather that of the body, or mass, *as a whole*, than that of any particular constituent of the same. To this end, say, in a mixture of two dissimilar clays, the more open clay, of lesser shrinkage, should be present in larger bulk; however, in pottery, the addition of sand or ground-burnt clay—sometimes both—is necessary for the greater bulk of the work, which somewhat complicates matters. Under these circumstances, the more plastic clay is added in slight excess: just sufficient to control the shrinkage generally, but nothing beyond; any large excess would be harmful. This is really the secret of good and correct blending; not by any means so universally known as it might be. Nevertheless, it is this addition of a dense, highly-shrinking and plastic medium, that causes two-thirds of the losses incidental to clayworking operations. Not on account of the material, which is often, in itself, indispensable to the mixture, but on account of improper treatment at the operator's hands.

THE INTRODUCTION AND EXTENSIVE USE OF MACHINERY for the preparation and mixing of clay has much to answer for in the latter direction. Machinery has been devised in the way of crushers, rollers, mixers and pugs—chiefly by engineers, with an eye to a large and rapid output, which is generally attained, but at what cost? The machinery stands, with a given working capacity: a fixed and definite quantity, so to speak; but it has no power to give and take: to adapt itself to circumstances incidental and necessary in the preparation and treatment of dissimilar clays, mixtures and bodies. In short, if the properties of any given clay do not fall in with the treatment meted out by the machine, so much the worse for the clays. These remarks must not be construed as being reactionary in character: as a veiled attack on the use and application of machinery in the clayworking industry. The use of machinery is absolutely essential to very many operations connected with the manufacture of pottery; however, it is decidedly more useful and reliable in a power giving sense, than from the purely manipulative standpoint. The late Mr. Cowen, of fire-brick fame, no mean authority, always insisted on the superiority of hand-made fire-bricks over those made by the machine. And further, it is a well known fact that glass pots, retorts, and work of a similar character are best made by building up with the hand: by the addition of the plastic material in small quantities; rubbing and working the same in with the tips of of the fingers. This by the way; machinery is right enough in its proper sphere; it is the recognition of its limitations that calls for remark, and which deserves more than passing attention at the clayworkers hands.

SOME CLAYS will take up and absorb as much water in ten minutes as others will take up and absorb in two or three hours; that is under given conditions, all things being equal. Matters may, of course, be influenced either way, by the state of division and by the bulk of the mass. Seeing the quantity of clay, etc., under treatment, and its rapid transit through the mixer, pug, or mill, the time given for soaking, mixing and pugging is, in the majority of cases, quite inadequate for the work.

Sale of Brickworks.—The Lion Tin Plate Works and Brick Works at Nantyglo, Monmouth, covering an area of about 3½ acres, were sold by auction recently at Newport by Messrs. Stephenson and Alexander for £5,000, this price including the plant, machinery, &c. The property is held for 18½ years unexpired at a rent of £250 per annum.

WIRE-CUT BRICKS WITH FROGS.

To the Editor of "THE BRITISH CLAYWORKER."

SIR,—With reference to the previous correspondence on this subject, I was pleased to see Mr. Hunter's letter on the question. As an Engineer, he will agree with me as to the primitive method claimed as a "patent invention."

In my varied experience amongst brickworks I find frogged bricks (with the exception of best pressed of course), to have gone out years ago, the same object being gained, together with many other advantages, by the perforated brick. As is so well known, this is simply done by inserting a core bar of 3, 12, 18, or 19 holes usually, within the die almost flush with the mouthpiece. These bricks are invariably well taken to wherever introduced; they are infinitely cheaper to make, take considerably less clay, are lighter and of equal strength when build in a 9in. or 18in. wall.

I would say that a wall built of frogged bricks must be able to withstand a greater pressure longitudinally and sideways than one of plain sand stock or what we term a "plain solid." With an ordinary vertical or crushing strain, results would not vary much.

Yours truly,
GEO. T. DURANT.

Armstrong's Works,
Northampton,
20th September, 1899.

To the Editor of "THE BRITISH CLAYWORKER."

DEAR Sir,—The following facts, bearing upon this question, have established themselves in my mind, as the result of practical experience.

Brickwork, either in mortar or cement, put up with ordinary wire-cut bricks, without frogs, is quite as strong as if built with bricks having frogs. In very hard, smooth-faced bricks, a frog is an advantage, but it should be on both sides of the brick.

The frog or panel need not be so deep as is usual in pressed bricks, and any irregularity that would form a key would do as well.

The frog of course reduces the weight of the brick, more or less, according to its depth, with the result of a small saving in carriage when actual weights are taken. The value of the mortar or cement wasted in filling up the frog or panel far outsets the saving referred to. A frog on one side is often the cause of distortion in drying. The idea of making a frog in wire-cut bricks is not novel, for it is a good many years ago since I first did the same thing, but I have no patent to defend, and I am not prepared to comment upon the validity of the one taken out by Mr. Cornish. I must, however, say that where it is desirable to have a frog in wire-cut bricks, the simple and inexpensive arrangement adopted by Mr. Cornish would be hard to beat.

Yours very truly,
JOS. JOPLING.

Wallington, Surrey,
Sept. 20th, 1899.

Electricity for Lead-poisoning.—Electric baths are being tried in cases of lead-poisoning at Wolverhampton. Some 35 cases have been sent from the big pottery towns to be treated, and a large number of them are progressing favourably.

A CONTINUOUS REGENERATIVE GAS KILN.—II.

THE subject of firing refractory bricks and other clay goods in a continuous regenerative gas kiln was dealt with in "The Times" in the year 1881, and much more recently in the "Clay Record" and "The Brickmaker," both of Chicago; consequently there need be no excuse for not knowing of the invention, which, by the way, has also been brought under the notice of the users of high temperatures in furnaces in this country on a large scale, through the medium of the technical press. So far as America is concerned, those persons whose profession is the burning of clay wares have been told in no unmistakable language that they are behind the British manufacturers, the object being attained in the most thorough manner in the continuous kiln, where the products of combustion are the raising of the heat of the green ware, while the air for combustion is heated by being drawn through the burnt ware which is in the process of cooling-off.

In its successful application to brickmaking the regenerative principle involves several conditions. One of these is that the radiation of heat from the outside of the furnace should be used for some purpose, or reduced to a minimum, or entirely prevented. Another is, that the combustible gases should be consumed at the point where the temperature is required to be highest; and that the temperature in the chimney where the gases are discharged from the furnace should be only sufficient to produce the draft necessary to carry them off. Until of late the necessity for using high heats in burning fire-clay wares has not been specially felt. But with the introduction of metallurgical processes using very high heats, like the open-hearthed steel and the basic processes, has required very special attention to be paid to the proper manufacture of fire-brick. It has become necessary not only to have them of much better quality, but also to have them burned at a much higher temperature than formerly.

The use of natural gas as fuel in metallurgical operations has paved the way for the general adoption of artificial fuel gas. With so many different means of attaining and regulating the temperature in gas furnaces, and with such perfect control over the admission of gas and air, and over the chimney draft, there are but few industrial processes requiring heat to which producer gas ought not to be capable of being advantageously applied.

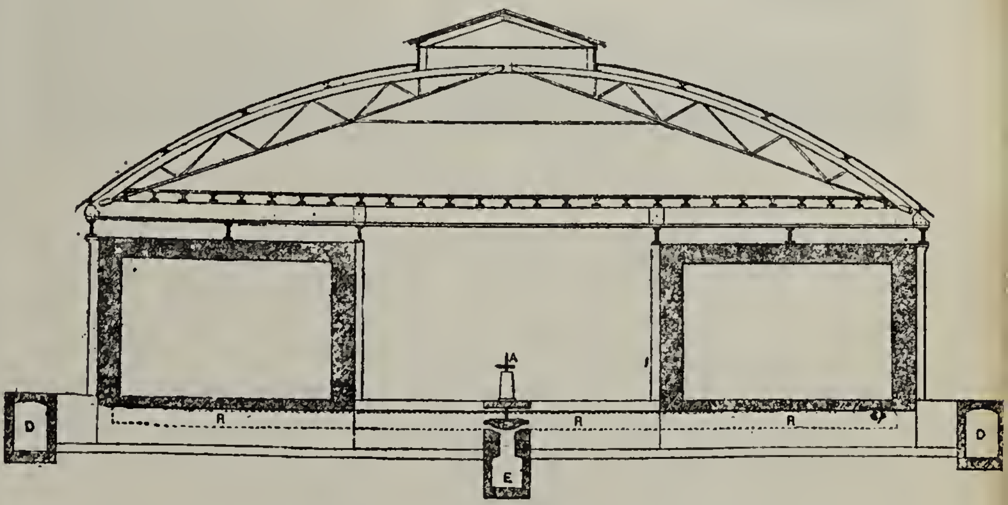
Now the Dunnachie kiln is really a gas-fired kiln, and it is fired with comparative ease, even more easily than the simplest form of down-draft kilns is fired. The gas producer in which the gaseous fuel is generated has now been so long before the public as to have become so well known as not to require any description. It certainly provides the cheapest fuel gas that can be made, and answers all purposes where the air necessary for its combustion can be heated by the off-going heat of the furnace.

The adoption of Dunnachie's continuous gas kiln by such leading firms as Messrs. Harbison and Walker, of Pittsburg, Pa.; the Perth Amboig Terra-cotta Company, of Perth Amboig, N.J.; the Kentucky Firebrick Company, of Portsmouth, Ohio, and others, shows that the question and gas-firing of fire-clay products has been settled in the United States.

In firing the Dunnachie kiln the gas is obtained from a couple of producers (see Fig. 1, p. 172), each capable of decomposing 4-cwt. of dross or slack per hour. The hot-air and gas meet at the floor level, where they burn with an intense heat. Being under perfect control they may be increased or diminished in quantity at will, and may be proportioned to give any quality of flame required. A flue is used to draw air from one chamber to another at a higher level, thus effectually exhausting the heat of the burned-off kiln, and at the same time shifting the intensity of the heat nearer to the back part of the burning kiln. By a simple arrangement of dampers, the same flue may also be used to admit cold air in sufficient quantity to reduce, if need be, the intense heat of the front, and permit of the back part of the kiln being hard burned without injury to the front bricks.

The chambers of the Dunnachie furnace are numbered 1 to 5 on one side, and 6 to 10 on the other; the two rows of chambers being about 20ft. apart. This space and the whole top of the kiln may be covered with a roof, if desired, as shown in Fig. 2. Under this roof there is a floor, partly of iron and partly of wood, used for the purpose of drying the green bricks previous to their being burned. From this floor the dried bricks are lowered by a balance-lift to the space between the two rows of kilns convenient to the charging doors. The space covered by that floor can be used for drying 2,000 bricks per day. It can also be used for temporarily housing what has been taken out of the kilns. The internal dimensions of each one of the chambers are 17ft. by 10½ft., and 10½ft. in height, so that each chamber is capable of burning from 15,000 to 20,000 firebricks of common sizes, the exact number depending on the dimensions and shapes of the bricks. Such a kiln as above described is capable of producing 400,000 per month. The operation of charging is proceeding on one side, and the operation of discharging on the other, so that there is no waste of time in carrying out the operations.

Fig 2.
CROSS SECTION



At one end of the chambers, on the outside, there are two producers B, Fig. 1, of any ordinary construction. The gas is carried by a down-take to an underground flue, E. Those which are used at Glenboig can burn 4 cwt. of a poor slack coal per hour, and give off sufficient gas, with the hot-air regeneration, by the cooling brick, to bring the brick being burned up to a blue-white heat. That underground flue connects by screens of alternate flues, R, with each one of the kilns. To regulate the supply of gas for each kiln, 10 valves, AA, one for each kiln, are placed in a straight line in the flue E, at the extremity of the flue R, carrying the gas from the main flue to the kiln, so that any quantity of gas may be delivered to any of the kilns independently of the others, or be shut off from them entirely. The gas valves F are made of fire-brick, and the valve-seat is also of fire-brick. It is placed over the flue E. The valve F is raised or lowered by the hand-wheel A, so as to regulate the supply of gas for combustion.

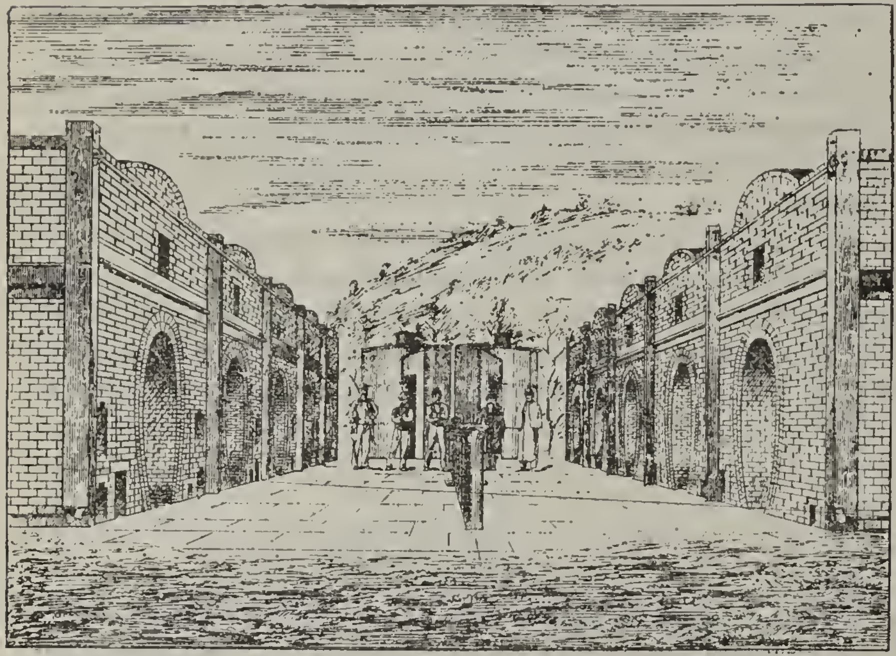


Fig. 3.—Perspective View.

On the side of the flue R, are carefully adjusted openings, N, through which the gas passes in equal volumes and at equal pressures the whole width of the kiln, Figs. 4 and 5, and enters Q. The gas meets the air a little below the floor level; thence, as shown by the arrow, it passes into the floor of the chamber upon one side. This space marked Q is called the burner. The openings from the gas flue R into the burner Q consist of a series of slits N, at Fig. 4.

LONGITUDINAL AND VERTICAL SECTION

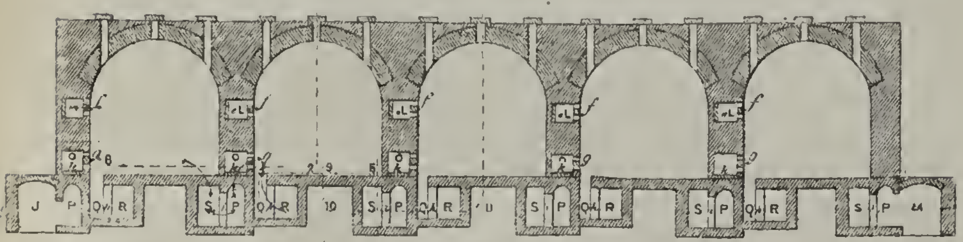
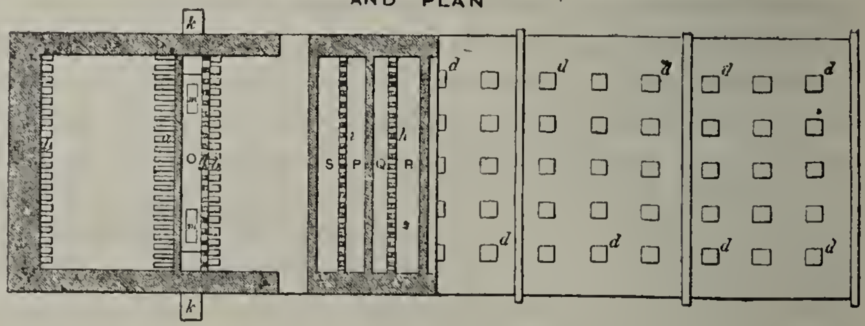


Fig. 4.

Hot air from the cooling brick is made to pass through the chambers in front, and when it is sufficiently cooled, can be made to pass into the chimney by means of a damper. By this arrangement the gas can be allowed to enter in any quantity to any of the chambers, or be entirely shut off from them. The end chambers 5 and 6 connect with the underground flue M, and the chambers 1 and 2 with the flue J (Figs. 1 and 4) through slits in the wall of P, so that there is a constant circuit of the gas coming from the producers on either side, maintained by means of this flue. All round the outside of the chambers and connected with them on the opposite end from the gas are other channels, D and C, which lead to the main chimney, so that the supply of gas and air can always be constant, and the draught, with or without pressure, can always be regulated in each one of the chambers by means of the dampers, exactly as required for the particular phase in which each one of them happens to be at the time.

At the Glenboig works, where everything is carefully done, the saving of fuel by the use of these kilns reaches 75 per cent., and there is also a very considerable reduction in labour and repairs. These kilns have been run continuously for three years at a stretch without repairs of any kind being required. As the mixture of gas and air is always under perfect control, the heat may be raised or lowered according to indications given by looking into the kiln, and is always uniform from one end of the furnace to the other, so that there is no breaking of the clay wares from sudden or unequal heating, and almost no hard or soft brick are produced, the brick being uniformly burned.

Fig 5
SECTION ON 7.8 9,10.11
AND PLAN



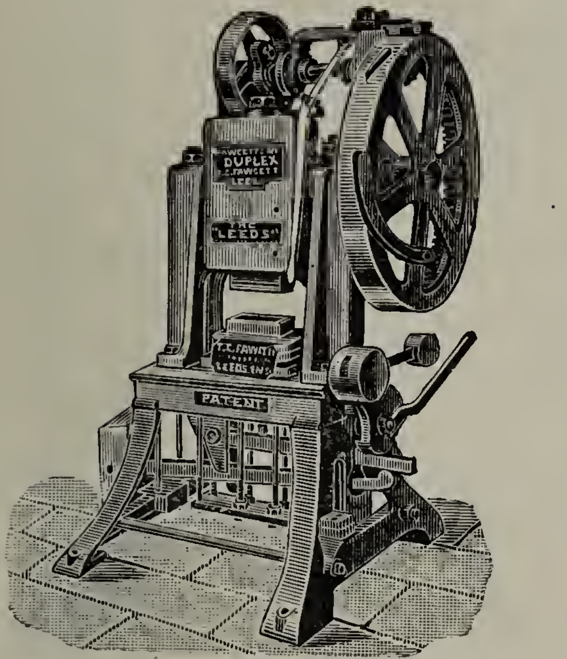
At Tamworth, in England, where the famous Staffordshire blue bricks are manufactured, it is shown that the continuous regenerative gas kiln can be adapted. It also serves for the burning of the Sheffield silica or "ganister," brick, and of the "Nocilis" (pure flint) made at Glenboig works. It has likewise been used successfully at Bournemouth for the burning and salt-glazing of sewer pipes. At Fig. 3 there is shown a perspective view of one of the Dunnachie regenerative gas kilns. The illustration presents a view looking into the intermediate space between the two rows of kiln chambers, and shows the two gas producers with their downtakes arranged at the end of the space. The kiln is shown without roof.

Here is a brief detail of the mode in which the ten chambers of a kiln may be occupied:—

No. 1 chamber.—Being emptied.
No. 2 chamber.—Opened and being cooled.
No. 3 chamber.—Red-hot, being cooled by the air supplied through the flue at its base for chamber No. 5 in full fire.
No. 4 chamber.—White-hot, being cooled by hot air for No. 3 chamber, for chamber No. 5 in full fire.
No. 5 chamber.—In full fire for 36 to 48 hours.
No. 6 chamber.—First benefit kilns getting ready for full fire.
No. 7 chamber.—Heating-up; towards the last getting to a bright-red heat.
No. 8 chamber.—Steaming for 48 hours; green brick.
No. 9 chamber.—Filling with green brick.
No. 10 chamber.—Ready for filling, undergoing repairs, etc

THE "LEEDS" BRICK PRESS

With Fawcett's Patent Stopping and Dead-weight Thicknessing Motion and Differential Pressure.



This Press is very largely used for pressing glazed bricks, which require to be all of exact equal thickness. It will press about 4,000 bricks per day with one boy to operate it, and will press them all of one exact equal thickness, although the quantity of clay may vary half-a-pound; this is done by the patent compensation arrangement of bottom moveable panel with levers and weights.

It is also suitable for pressing all kinds of plain and ornamental, red and glazed bricks, tiles, and terra-cotta work.

It is also fitted with my patent differential purchase gearing, for giving double purchase while pressing the brick, which is a very necessary and advantageous feature over other Presses.

The Machine is substantially built, and of the best materials; all bearings are bushed with best gun metal, and of extra large sizes. The pressure is obtained by our well-known patent toggle-motion levers, which are all of the best crucible steel; all the working parts can be seen while the machine is at work, and are easy of access for oiling, etc. It is very easily and quickly adjusted for different thicknesses of bricks. It is also fitted with automatic gear for stopping the pressing head at the top after pressing the brick, and automatically lifting it out of the mould ready for taking away by hand instead of by the usual pushing arm; another brick is then put on, and by moving a small handle close to the operator, the machine starts and completes another cycle of operations.

THOS. C. FAWCETT, LTD.,
Whitehouse Engineering Works, Hunslet Road, LEEDS.
Makers of Patent Semi-Dry and Plastic Machines, Steam and Hand Presses, Pug Mills, Solid and Perforated Bottom, Clay Grinding Pans, Clay Crushing Rollers, Clay Mixers, Sieves, Engines, Shafting, and
GENERAL BRICK & CEMENT MAKING PLANT.
ILLUSTRATED CATALOGUES ON APPLICATION.

PHYSICAL TESTS OF NEW YORK SHALES.

By Heinrich Ries, Ph.D.

With the great expansion in the manufacture of clay-products with a vitrified or impervious body, such as paving-brick, roofing-tile, sewer-pipe, etc., the producers of this grade of wares have naturally looked about for some abundant material which would give the best and cheapest results. The requirements of such a material are, that it must burn to a hard, impervious body at a moderate temperature, and secondly, that the difference in temperature between the point of vitrifaction and viscosity must be sufficiently great to permit the clay being heated to one stage without damage of running into the other.

It has been found that shales frequently answer these requirements better than other clays, and they are consequently much used. On account of their high percentage of fusible impurities they generally burn easily to a dense body, and when ground and mixed with water their plasticity is often very strong. If the ground shale happens to be too lean, that is, lacking in plasticity, this can often be easily remedied by the addition of some plastic clay; or, again, the fusibility may sometimes require lessening by the addition of more refractory shale or clay, often obtainable from the same mine. The difference in temperature between vitrifaction and viscosity will vary, being as little as 50° Fahr. in some calcareous shales, and 200° Fahr. in others. While the nearer it approaches 200° Fahr. the better it is (Wheeler claims it should not be less than 200° Fahr. Vitrified Paving-Brick, Indianapolis, 1895), still many good vitrified wares are made from clays in which the difference between vitrifaction and viscosity is only 100° Fahr.

Summary of Physical Tests.

Locality.	Character of Shale.	Per cent. Water Added.	Plasticity.	Av. Tensile Strength. Lbs. per sq. in.	Max. Tensile Strength. Lbs. per sq. in.	Shrinkage in Drying.	Shrinkage in Burning.	Degrees Fahrenheit.		
								Incipient Fusion.	Vitrifaction.	Viscosity.
						per ct.	per ct.			
Jamestown.	Gritty	18.5	Lean	16	20	4.5	7.5	1950	2050	2200
Angola.	Fairly smooth	21,4	Mod.	91	95	4.0	10	1900	2050	2200
Hornellsville.	Gritty	20	Lean	34	39	2,7	5.3	1900	2050	2200
Alfred Centre.	Fairly smooth	22	Mod.	61	62	4	9	1900	2050	2150
Cairo. Mixture Clay and Shale.		23	Good	77	100	4	9	1900	2050	2150

In the southern half of New York State are great beds of shale of Hamilton and Chemung age. These beds extend from the Hudson River westward to Lake Erie, and the northern boundary of the area underlain by them follows closely a line connecting Albany and Buffalo. The Hamilton shales and interbedded sandstones form a belt averaging about 14 miles in width just south of this line, and the Chemung shales extend from the southern boundary of the Hamilton half way to the southern edge of the State. In the central and westward portion of the area they are especially argillaceous, but towards the east the shales are frequently quite siliceous.

At present these Devonian shales are utilized at Angola, Jewettville, Hornellsville, Alfred Centre, Corning and Cairo; the products made from them, including paving-brick, sewer-pipe, roofing-tile, terra-cotta, dry-pressed brick and drain-tile,

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BOOK-KEEPING FOR BRICKMAKERS.—IX.

APPENDIX.

BRICKMAKERS' ACCOUNTS.—FORMS.—*(Continued.)*

No. 7.—THE EASTVILLE BRICK CO.—PRIVATE LEDGER—*Continued.*

F. L. CAPITAL ACCOUNT. 26

Date		J.	£	s.	d.	Date		J.	£	s.	d.
1896						1896					
Dec. 31	To Transfer Drawings	2	30	0	0	Sept. 1	By Balance		6,000	0	0
	To Balance		6 855	4	0	Dec. 31	,, Interest	1	100	0	0
							$\frac{3}{7}$ths Share of Profit	2	785	4	0
			£6,885	4	0				£6.885	4	0
						Dec. 31	By Balance		£6,855	4	0

F. L. DRAWING ACCOUNT. 27

Date			£	s.	d.	Date		J.	£	s.	d.
1896						1896					
Nov. 2	To Cash	9	30	0	0	Dec. 31	By Capital Account	2	30	0	0

INTEREST ON CAPITAL. 28

Date		J.	£	s.	d.	Date		J.	£	s.	d.
1896						1896					
Dec. 31	To G. H.	2	130	0	0	Dec. 31	By Profit and Loss	2	230	0	0
	,, F. L.	,,	100	0	0						
			£230	0	0				£230	0	0

No. 8.—THE EASTVILLE BRICK CO.—JOURNAL.

1

Date			£	s.	d.	£	s.	d.
1896								
Dec. 31	Kiln B......Dr.	35	210	0	0			
	To Sales	30				210	0	0
	Being 280,000 Bricks used on this Kiln at 15s. per m.							
	Kiln B......Dr.	35	40	0	0			
	Machinery and Plant......Dr.	31	17	0	0			
	To Wages (Capital)					57	0	0
	Being allocation of Capital Wages as per summary of Wages Sheets.							
	Bad Debt Account......Dr.	47	109	0	0			
	To Book Debt Provision	49				109	0	0
	Being a reserve for bad and doubtful debts, and discounts of 2% on Sales, say £5,450							
	Sundry Expenses......Dr.	15	20	0	0			
	To Wages (Revenue)	4				20	0	0
	Being incidentals at Works included in Wages as per Wages Summary.							
	G. H. Capital Account......Dr.	24	50	0	0			
	To Drawings	25				50	0	0
	F. L. Capital......Dr.	26	30	0	0			
	To Drawings	27				30	0	0
	Interest on Capital......Dr.	28	230	0	0			
	To G. H. Capital a/c	24				130	0	0
	,, F. L. do.	26				100	0	0
	Carried forward		£706	0	0	£706	0	0

2

Date			£	s.	d.	£	s.	d.
1896								
	Brought forward		706	0	0	706	0	0
Dec. 31	Profit and Loss......Dr.		1,810	5	0			
	To Wages	5				1,363	0	0
	,, Coal	4				400	0	0
	,, Manufacturing Materials	2				23	15	0
	,, Repairs and Renewals	3				23	10	0
	Profit and Loss......Dr.		426	12	0			
	To Salaries	6				80	0	0
	,, Agent's Commission	7				69	0	0
	,, Travelling Expenses	12				14	8	0
	,, Printing, Postages, etc.	11				8	5	0
	,, General Expenses	13				42	7	0
	,, Rates, Taxes and Insurance	14				50	0	0
	,, Bank Commission	9				3	0	0
	,, Discounts	10				50	12	0
	,, Bad Debts	17				109	0	0
	Profit and Loss......Dr.		2,132	5	0			
	To Mortgage Interest £76 2 6	23						
	Less Bank Interest 6 0 0	9						
						70	2	6
	,, Interest on Capital	28				230	0	0
	,, Profit divided:—							
	G. H. Capital, $\frac{4}{7}$ths	24				1,046	18	6
	F. L. do. $\frac{3}{7}$ths	26				785	4	0
	Profit and Loss......Dr.		1,457	0	0			
	To Carriage and Carting	8				1,457	0	0
	Sales......Dr.	15	5,676	2	0			
	Stock......Dr.	16	150	0	0			
	To Profit and Loss					5,826	2	0
			£11,912	4	0	£11,912	4	0

No. 9.—THE EASTVILLE BRICK CO.—BILLS RECEIVABLE.

1

No.	Date Received.	From whom received.	Drawer.	Accepter.	Payable at.	Date drawn.	Term.	Payable.												Sold Ledger Folio.	Amount of Bill.	Discount.	How disposed of.		Cash Book Folio.	Amount.
								Jan	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.							
	1896					1896															£ s. d.	£ s. d.	1896			£ s. d.
1	Oct. 5	Newman, J., & Co.	Eastville Brick Co.	Newman	Lloyds, Yarmouth	Oct. 1	2 m.												4	9	150 0 0		Dec. 2	Bank	10	150 0 0
2	Dec. 1	Do.	Do.	Do.	Do.	Dec. 1	1 m.	4												9	199 0 0	1 0 0 P.L. 10				

8

No. 10.—THE EASTVILLE BRICK CO.—CASH BOOK.

8

Date.	Particulars of Receipt.	Led. Fo.	Discount.	Cash.	Bank.	
1896			£ s. d.	£ s. d.	£ s. d.	£ s. d.
Sept. 1	To Balance brought forward	...	...	...		1500 0 0
,, 6	Cash	...	...	50 0 0		
			...	50 0 0		1500 0 0
Oct. 1	To Balance brought forward............	...	...	17 0 0		1117 0 0
,, 10	City Gas Co.	2	1 12 0	...	87 2 0	
	James Bros..........	1	...	...	100 0 0	187 2 0
,, 11	Thompson, J. & Co.	3	5 0 0	...	195 0 0	
	Knox & Sons	8	...	...	200 0 0	395 0 0
,, 20	Williams & Sons ..	6	6 12 0	...	294 0 0	
	Day, J., & Co. ...	7	2 10 0	...	160 0 0	454 0 0
,, 31	Cash	...	...	50 0 0		
		£	15 14 0	67 0 0		2153 2 0

Date.	Particulars of Payment.	V'ch'r No.	Led Fo.	Discount.	Cash.	Bank.	
1896				£ s. d.	£ s. d.	£ s. d.	£ s. d.
Sept. 3	By Wages (Capital)		1	...	...	3 0 0	
	200,000 (Revenue)		5	...	...	77 0 0	80 0 0
,, 6	Cash from Bank...		...	...	..		50 0 0
	Petty Cash		1	...	2 0 0		
,, 10	Wages (Capital) ...		1	...	...	4 0 0	
	215,000 (Revenue).		5	...	...	81 0 0	85 0 0
,, 17	Wages (Capital) ...		1	...	...	3 0 0	
	225,000 (Revenue).		5	...	...	83 0 0	86 0 0
,, 24	Wages (Capital) ...		1	...	...	5 0 0	
	200,000 (Revenue)		5	...	...	77 0 0	82 0 0
,, 25	Petty Cash		1	...	5 0 0		
,, 30	Salaries..............		6	...	20 0 0		
	Petty Cash		1	...	6 0 0		
	Balance forward		...	...	17 0 0		1117 0 0
			£	...	50 0 0		1500 0 0
Oct. 1	By Wages (Capital)		1	...	...	3 0 0	
	180,000 (Revenue).		5	...	...	70 0 0	73 0 0
,, 8	Wages (Capital)...		1	...	...	2 0 0	
	200,000 (Revenue).		5	...	...	77 0 0	79 0 0
,, 15	Wages (Capital) ...		1	...	...	9 0 0	
	180,000 (Revenue).		5	...	...	71 0 0	80 0 0
,, 20	G. H., Drawing ...		25	...	...		50 0 0
,, 22	Wages (Capital) ...		1	...	...	3 0 0	
	210,000 (Revenue).		5	...	...	79 0 0	82 0 0
,, 29	Wages (Capital) ...		1	...	...	2 0 0	
	220,000 (Revenue).		5	...	...	83 0 0	85 0 0
,, 31	Salaries.....		6	...	20 0 0		
	Cash from Bank ...		..	..			50 0 0
	Petty Cash		1	...	8 0 0		
	Carrier, H.		3	...	...		25 0 0
	Wood, Bros.		5	...	...		15 0 0
	Bishop & Co.		7	...	...		5 0 0
	Binder Bros.		9	...	..		300 0 0
	Fowler & Co.		11	...	..		5 0 0
	Imp. Insurance Co.		13	...	...		10 0 0
	Smokeless Coal Co.		17	...	...		20 0 0
	Bridge Colliery Co.		19	...	...		25 0 0
	Marks, J. & C. ...		21	...	...		10 0 0
	North Junction Railway. Coal		23	...	...		40 0 0
	Do. Bricks		25	..	...		320 0 0
	Discount allowed per contra		10	15 14 0	...		
	Balance forward ...			...	39 0 0		879 2 0
			£	15 14 0	67 0 0		2153 2 0

9

No. 10.—THE EASTVILLE BRICK CO.—CASH BOOK—*Continued.*

9

Date.	Particulars of Receipt.	Led. Fo.	Discount.	Cash.	Bank.	
1896			£ s. d.	£ s. d.	£ s. d.	£ s. d.
Nov. 1	To Balance brought forward	..	...	39 0 0		879 2 0
	James Bros.	1	...	...	200 0 0	
						200 0 0
,, 10	City Gas Co.	2	5 0 0	...	164 0 0	
	Johnson Bros.	5	...	...	200 0 0	
						364 0 0
,, 18	Thompson, J., & Co.	3	6 0 0	...	390 0 0	
	Read, J. R., & Son	4	...	...	38 0 0	
						428 0 0
,, 24	Williams & Sons	6	1 19 0	...	210 0 0	
						210 0 0
		£	12 19 0	39 0 0		2081 2 0
Dec. 1	To Balance	...	...	14 10 0		1083 17 0
	James Bros.	1	5 3 0	...	152 0 0	
	Johnson Bros.	5	0 12 0	...	64 0 0	
	City Gas Co.	2	1 15 0	..	199 0 0	
						415 0 0
,, 2	Bill No. 1, due 4th B.L.	1	...	...	150 0 0	
						150 0 0
,, 18	Read & Sons	4	1 15 0	...	70 0 0	
	Williams & Sons	6	4 14 0	...	146 0 0	
						216 0 0
,, 28	Knox & Sons	8	7 0 0	...	343 0 0	
						343 0 0
,, 31	Cash	...	...	30 0 0		
	Bank interest	9	...	...		6 0 0
	Balance	...	...	..		1223 5 6
		£	20 19 0	44 10 0		3437 2 6

Date.	Particulars of Payment.	Vch'r No.	Led. Fo.	Discount.	Cash.	Bank.	
1896				£ s. d.	£ s. d.	£ s. d.	£ s. d.
Nov. 2	By F. L., Drawing	...	27	...	...		30 0 0
,, 5	Wages (Capital)	...	1	...	...	2 0 0	
	190,000 (Revenue).	...	5	. .	...	80 0 0	
							82 0 0
,, 12	Wages (Capital)	...	1	...	...	4 0 0	
	200,000 (Revenue).	...	5	...	...	79 0 0	
							83 0 0
,, 19	Wages (Capital)	...	1	...	...	5 0 0	
	180,000 (Revenue).	...	5	...	...	70 0 0	
							75 0 0
,, 26	Wages (Capital)	...	1	...	...	3 0 0	
	220,000 (Revenue).	...	5	...	...	86 0 0	
							89 0 0
,, 30	Salaries	...	6	...	20 0 0		
	Petty Cash	...	2	...	4 10 0		
	Carrier, H.	...	3	...	...		30 0 0
	Wood, Bros.	...	5	...	...		15 0 0
	Bishop & Co.	...	7	...	...		3 15 0
	Binder Bros.	...	9	...	...		18 10 0
	Fowler & Co.	...	11	...	...		6 0 0
	Roller & Sons	...	15	...	..		20 0 0
	Smokeless Coal Co.	..	17	...	...		35 0 0
	Bridge Colliery Co.	...	19	..	...		24 0 0
	Marks, J. & C.	..	21	...	...		16 0 0
	North Junction Railway. Coal	...	23	...	...		50 0 0
	Do. Bricks	...	25	...	...		380 0 0
	Eastville Poor Rate	...	27	..	...		40 0 0
	Discounts allowed per contra	...	10	12 19 0	...		
	Balance forward	...	...	...	14 10 0		1083 17 0
			£	12 19 0	39 0 0		2081 2 0
Dec. 6	By Wages (Capital)	...	1	...	...	3 0 0	
	212,000 (Revenue).	...	5	...	...	81 0 0	
							84 0 0
,, 13	Wages (Capital)	..	1	...	...	1 0 0	
	220,000 (Revenue)	...	5	...	...	85 0 0	
							86 0 0
,, 20	Wages (Capital)	...	1	...	...	2 0 0	
	200,000 (Revenue).	...	5	...	..	79 0 0	
							81 0 0
,, 27	Wages (Capital)	...	1	...	..	3 0 0	
	220,000 (Revenue).	..	...	...	...	85 0 0	
							88 0 0
,, 31	Freehold Land, purchase price to J. R. Ronald of land adjoining, 12¼ acres	...	20	...	...		2500 0 0
	Mortgage Interest, ½ year on £4,500, @ 3½ % less tax	...	23	...	...		76 2 6
	Cash from Bank	...	...	...	...		30 0 0
	Salaries	...	6	...	20 0 0		
	Petty Cash	...	2	...	6 10 0		
	Carrier, H.		3	...	...		20 0 0
	Fowler & Co.	..	11	...	...		4 0 0
	Smokeless Coal Co.	...	17	...	...		25 0 0
	Bridge Colliery Co.	...	19	...	...		35 0 0
	North Junction Railway. Coal	...	23	...	...		57 0 0
	Do. Bricks	...	25	...	...		300 0 0
	Active & Co.	...	29	...	...		48 0 0
	Bank Commission	...	9	...	...		3 0 0
	Discounts allowed per contra	..	10	20 19 0	..		
	Balance	...	...	...	18 0 0		
				20 19 0	44 10 0		3437 2 6

FLETTON, LIMITED?

We understand that negotiations are in progress for the formation of a Limited Liability Company, to embrace the leading yards of Fletton and District. We are not, however, in a position at present to make any definite statement, as nothing up to the time of our going to press has been settled. The acquisition of an output of something like 400,000,000 bricks per annum is certainly not a light undertaking. We shall have something further to say on the matter in our next issue.

GOVERNMENT BRICKS AND THOTHMES III.

[From a Correspondent.]

Lecturing in the Midlands not long since, on the special qualifications of earths for brickmaking purposes, we were electrified during the discussion to hear one of the audience formulate a criticism to the effect that we had neglected to state "straw" as an ingredient of the mixture from which bricks were made.

We have delivered many lectures in our time, but we had never experienced this sensation before. We should think but little of it if the criticism had emanated from an ordinary individual, but this was an extraordinary one—and we might give his name, only that he is such an excellent man in some other respects that we do not desire to hurt his feelings. However, we will say this much concerning him, so that we might frame his words with authority. He is a government official, and it is one of his functions to look after certain things connected with the clayworking industry. Probably he has never passed an examination (for that seems to be the only qualification for a Civil Servant now-a-days) on brickmaking, but he was evidently endowed with a good memory as to how they made bricks before Rome was built, or Julius Cæsar came into existence.

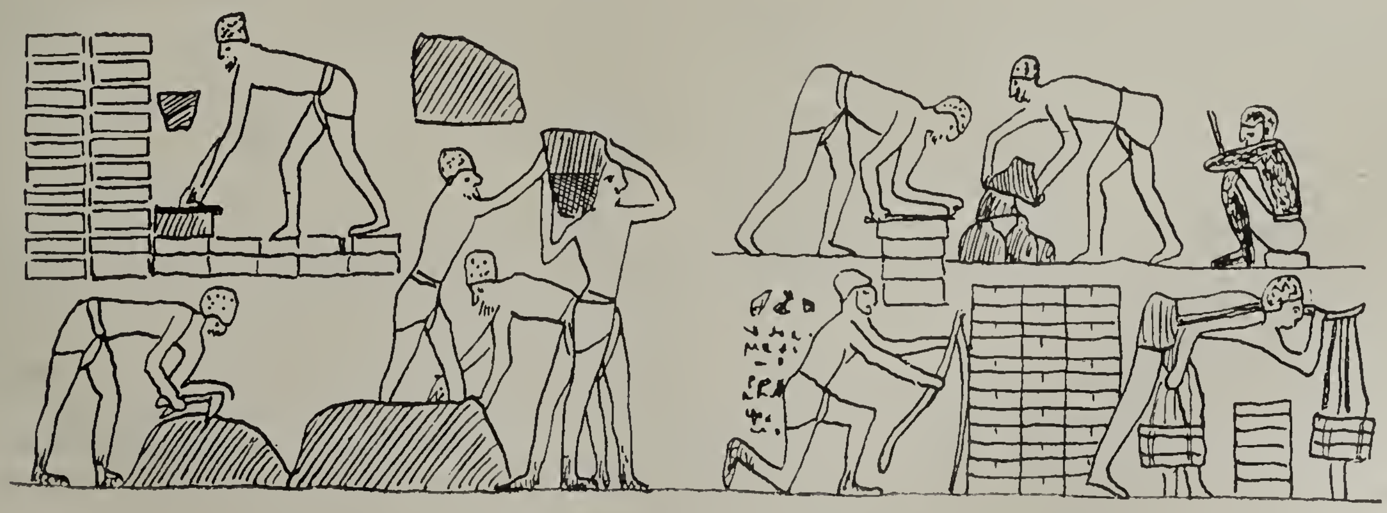
The audience did not laugh, they simply looked. At first they thought some joke was being perpetrated, but the sarcastic nature of the criticism was too apparent on the face of the correlative sentences, and they came to the same conclusion as the lecturer, who is writing this. They pitied the government official, but had mercy on him. It is easy to say nothing, and that is what we did.

So we thought we would write this article with the accompanying sketch, which might not altogether recommend itself to the official mind, now that the Quarries' Act is in full blast, but at any rate it represents the truth. It does not represent the manufacture of "Staffordshire blues," because these latter are not made with straw. There is no trace of fire-brick about it either, as fire does not enter into the question. Stock bricks?—Well, are tin-cans and leathern boots "straw" Besides, what is a stock brick? What did that magistrate say the other day?

This is a sketch from the walls of the tomb of Roschere, described as "Superintendent of the Great Buildings" to King Thothmes III. (They thought more of brickmakers in those days than they do now—since guns have been invented.) This Thothmes lived during the 18th dynasty of the Pharaohs of Egypt. He believed there "was nothing like brick." All his large buildings were of brick—Would that he still reigned! The sketch represents the process of brickmaking in Ancient Egypt, and the original is, no doubt, the earliest attempt at portraying the simple art of the clayworker. It will be noticed that some of the workmen are kneading the clay; others carry it on their shoulders, or mould it into curiously shaped bricks, or are placing the bricks in the sun to dry. As the Egyptians never *burned* their bricks, but only *baked* them in the sun, the bricks required straw to be mixed with the clay to make them more consistent. Many of the oldest pyramids of Egypt were built with these, and in a rainfall which amounts to next-to-nothing, they have stood very well.

But, we will not labour the subject. The question of how to make bricks now-a-days is of more interest than the throwing of light upon their manufacture in days gone by. For all that, the brickmaker is still looked upon by many people as a heathen, and quite outside the pale of civilization, while his methods of manufacture are supposed to be still conducted as they were in the old time aforesaid.

If government officials are in ignorance of the simple elements of brickmaking, is it any wonder that the general public are? Poor scorned brickmaker!



Brickmaking in Ancient Egypt—from the Tomb of Roschere.

BRICK KILN, WITH ARRANGEMENT FOR DRYING.

A patent has recently been taken out by an enterprising German, the object of which is to utilise the waste heat generated by the kiln, for the purpose of drying the unburnt bricks, which are placed over and around the kiln.

In the accompanying drawings Fig. 1 is a sectional elevation of a kiln constructed according to this invention, and Figs. 2 and 3 are sectional plans taken through the lines x—x and y—y respectively Fig. 1.

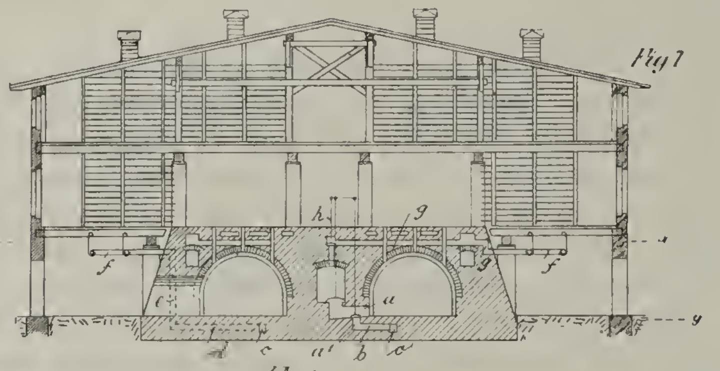


Fig. 2.

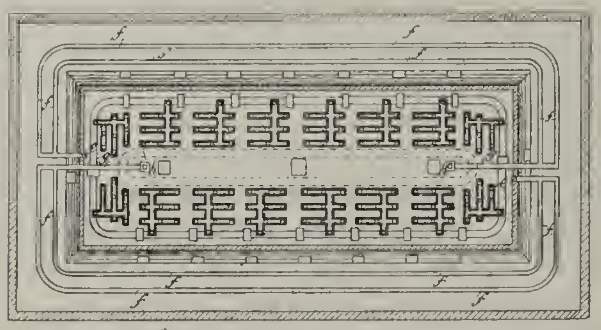
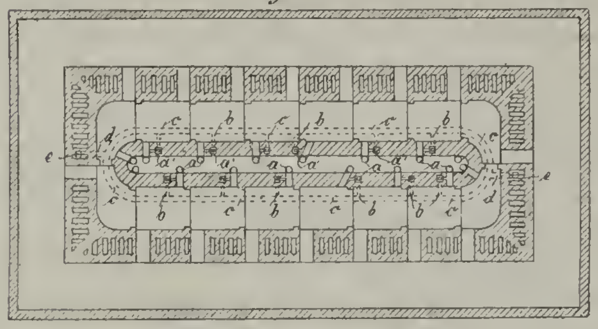


Fig. 3.



Adjoining the principal flues a running from the burning chamber to the smoke collector, subsidiary flues a^1 are arranged which communicate, by means of connecting channels b, with a heat supply chanel c. The channel c is situated beneath the hearth bottom and, if the kiln be an annular one, runs completely around it. This channel communicates by means of one or more connecting channels d with vertical shafts e, and through the shafts e with heat supply pipes f, which are arranged under the bottom of the drying compartment and communicate through a connecting pipe g, and a valve h, with the smoke collector and thereby with the chimney.

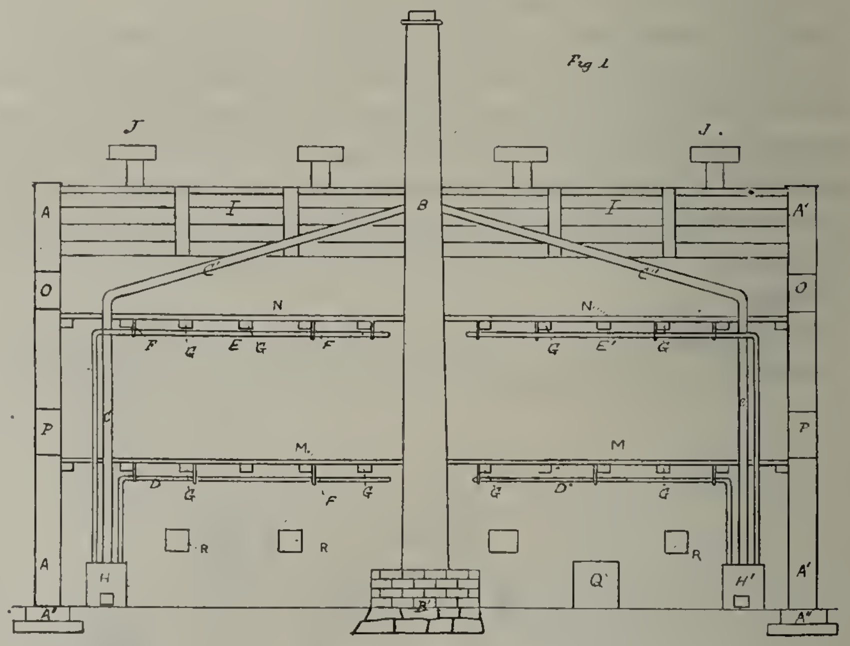
The action is as follows :—If the heat in the fire chamber is to be utilised for drying the unburnt bricks, the main flue of this chamber is stopped in the direction of the smoke collector and the cap of the subsidiary flue a^1 "pulled." The fire gases are then drawn through the subsidiary flue a^1 of this chamber and its connecting channel b into the heat supply channel c, thence through the connecting channel d and the vertical shaft e into the heat supply pipes f, heating them, and, following the draft of the chimney, pass away through the connecting channel g, the outlet valve h, the smoke collector and the chimney, into the open air. The heat from the pipes f is communicated to the upper drying spaces, in which the unburnt bricks are piled. If the heat from the smoke and the smoke vapours from the smoking chamber are to be utilised, the principal flue of this chamber is stopped and the subsidiary flue thereof opened.

A NEW DRYING SHED.

A PATENT for an improved form of drying shed has recently been taken by a Mr. Stevens, an engineer, of which we give some particulars and illustrations. The construction is preferably to be of rectangular shape, the basement being sunk beneath the ground. In this basement are placed furnaces for the heating of hot-water pipes, while the floor may be made of rafters of iron, steel, wood, or other suitable material. Girders or arches are formed, and upon these the rafters are placed, leaving space between each for the passage of air.

There may be one or more floors arranged above the other, besides the ground floor, which is formed as described, or shelves may be formed at the sides, ends, or middle of the floors where and as required.

The hot-water circulating pipes from the heating furnace are carried in suitably inclined directions, under any of the floors described, and one or more heating furnaces and sets of hot-water circulating pipes may be used.

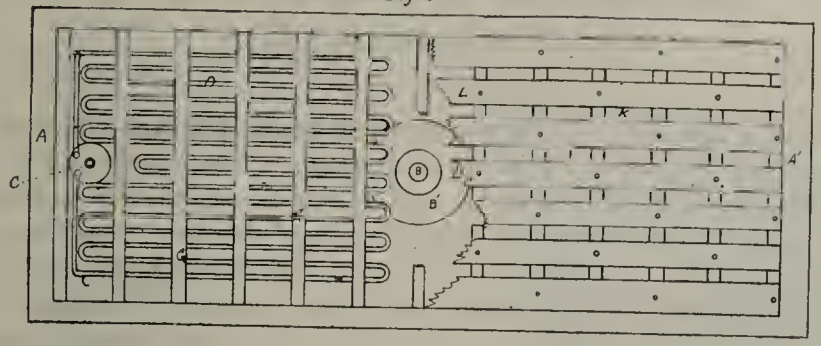


The products of combustion from the furnace or furnaces are carried up by means of pipes, and are placed under the topmost portion of the roof of the building in order to assist the upward current of heated air, and to carry off the vapour arising during the process of drying of goods ; suitable apertures are provided in the side walls or roof, controlable at will if required, for allowing the ingress of air or the egress of vapour. Trollies or trams may be run through or round the drying shed, and chambers in which various degrees of heat may be utilized in the process of drying, may be formed.

The method of working this drying house is as follows :—

The class of goods that require to be dried are placed on the floors M N, and arranged on benches or shelves, the arrangement being such that air can more or less pass between them. The furnaces H H^1 are now put into operation, and the temperature of the water in the pipes raised ; the result of this action is that outside air is drawn in through air holes R and passes over the heated coils D D^1 and through the air spaces K between the flooring pieces L of the floor M, and circulates over and around the plastic goods placed on the floor M, and by means of the heat imparted to the goods by the warmed air, evaporates a certain amount of moisture contained in the goods. The moist air further passes over and around the heated coils E E^1, and thence through the air spaces K between the flooring pieces L of the floor N. The heated air has a similar effect upon the goods situated on the floor N as it has upon those on the floor M.

Fig 2



The warm air now being fully charged with moisture escapes between the lower boards I or ventilators J. The waste heat imparted to the top floor N by the heat from the flue-pipe C^1 C^{11}, assists materially in raising the temperature in the air space of the floor N, and assists to further induce the current of warm air from the basement to the top floor of the drying house.

The joists when made of iron may have a strip of wood attached to the top side in order that the fastening down of the flooring pieces may be more readily effected.

Cleaning of Waste Waters by the use of Clay.—If an emulsion of clay is poured into a soap solution, the clay gradually separates out without clarifying the liquid. A few drops of hydrochloric acid, however, being added to a soap solution and a small quantity—about 1·5 per cent.—of a clay emulsion being poured in, the liquid clarifies at once, with formation of a plentiful sediment. Exactly the same process takes place when the waste waters from the combing process in spinning are treated with clay. The waters which remain turbid for several days contain 500 to 800 grammes of fatty substances per cubic metre. If to 1 litre of this liquid 1 gramme of clay is added, with 15 to 20 per cent. of water, the liquid clarifies with separation of a sediment and assumes a golden brown colour. Besides the fatty substances, this deposit also contains a certain quantity of nitrogenous bodies. Dried at 100° C., it weighs about 1·6 grammes and contains 30 per cent. of fat. The grease obtained from it is clear, of good quality, and deliquesces at 34° C. After removal of this fat, the mass still contains 1·19 per cent. of nitrogen. The analysis has given the following result : 0·44 ; organic substances, 0.28 ; and ash 0·28 Hence, the clay has absorbed 0·7 gramme of organic substances per litre of waste water.—Schönmann's Journal für Lederindustrie.

QUERIES AND REPLIES

Boiler Water from Pit.—*Can any of your readers help me? Last Winter I deepened my reserve water pits about 6 feet, in red marl. I have not had occasion to use any of the water until recently, and I find it has not settled at all, but is red and thick just as if it was stirred up every day. As I now want water jor my boiler, can I cure this?*—M. C. J.

In reply to M. C. J., it is very evident from his description of the state of the water in his deepened pits, that in the 6ft. sinking he has been unfortunate enough to strike a bed from which some mineral matter exudes. As he says the water is both "red and thick," and the formation in which the pits are dug is "red marl," that mineral matter is probably iron. It is not stated whether the red marl is the source of the water ; if it is, then we are afraid nothing can be done to amend matters, But if it is not, and the pits are merely dug as collecting reservoirs, the water being obtained elsewhere and run into them, then by making the pits tight the nuisance may be effectively coped with. A good way of doing this is to empty the pits as far as possible, puddle their bottom and sides, and use concrete in fair thickness over the puddle. This is expensive, but the question is a difficult one. Much of the matter (thick) in suspension in the water might be removed by sand filtration, the filter being made as follows. A foundation of large stones, some 5 or 6 inches diameter, loosely thrown together, from which the filtered water may escape by means of a suitable pipe fixed at this part of the filter. Above these large stones a layer, say a foot in thickness, of smaller ones may be placed, decreasing in size upwards. On top of this a thin layer (few inches) of coarse grit, surmounted by coarse sand (few inches), and the top of the filter should be fine sand. Such a filter would certainly remove most of the particles in suspension in the water, it is inexpensive, and may be renewed as occasion may arise by simply scraping off and renewing the layer of fine sand at the top. It may be that much of the iron in solution may also be removed at the same time, but in that case the filter would want reconstructing more frequently.

The Umtali Brick and Tile Company has gone into liquidation, and Mr. W. H. Low has been appointed liquidator. We may expect more South African failures before long.

The Building Trade in Glasgow.—At the opening of the Glasgow Dean of Guild Court, on the 27th ult., Sir James Bell, Bart., the Lord Dean of Guild, who presided, made the annual statement as to the work of the Court. He said that the activity in the building trade, which began to show itself in 1891-2, and increased year by year until it reached its highest point last year, had shown very little evidence of quieter trade. In the year prior to the one under review the linings were 649 in number, with a valuation of £2,106,760. Last year there was increase in the number of linings to 681, but a decrease in valuation to £2,017,330. In houses and shops there was a decrease in linings from 157 to 114, with a corresponding decrease of valuation from £1,240,410 to £921,385. In public buildings the linings were fewer in number, 5 as against 14, but the valuation showed an increase, £144,000, as against £135,710. In churches and halls there were fewer linings, 12, against 19 in the preceding year, with a decrease of £2,700 in value. In regard to alterations and additions, there were 402 linings, with a valuation of £341,775.

THE WORKMEN'S COMPENSATION ACT, 1897.

LOSS OF A THUMB.

At the Ruabon Brick and Terra Cotta Co.'s Works, a boy named Matthew had his right thumb taken off with a press. He was removed to the Cottage Hospital.

HAND CRUSHED.

At the brickworks of Messrs. Stanley Brothers, at Bedworth, a lad named Neale got his hand crushed in the machinery, necessitating amputation.

ENTANGLED IN MACHINERY.

Hugh Maxwell, an engineer, residing at Blackridge, Linlithgowshire, has been admitted to Edinburgh Royal Infirmary suffering from severe abdominal wounds, caused by his becoming entangled in the machinery at Broadridge Brickworks.

KILLED BY A FALL OF CLAY.

Whilst a man named John Hough, of Markfield, was "holing," in a claypit at the Ellistown brickworks, Leicester, a heavy fall of clay occurred, and crushed him. He was extricated after about fifteen minutes' digging by his comrades, but life was extinct; his neck and spine being broken. He was 30 years of age, and leaves a wife and family. He had been employed at the works about four years.

FALL FROM A KILN.

John Dolan, aged twenty-two, of St. Helens, was admitted to hospital suffering from severe shock and injuries. Dolan was employed at the Liverpool and St. Helens Brickworks, Ravenhead, when he fell from the top of one of the kilns on to some planks. His arm and thigh were badly bruised, and when assistance was rendered him, it was found that he was suffering severely from shock.

A BOY'S HAND INJURED.

The British Clayworkers' Mutual Insurance Corporation in Court.

In this case the applicant, John Cannon, of Adelaide Street, Bolton, sought to recover compensation from Mr. Joseph Higson, of Dean Church-lane, brickmaker, in respect of an accident to the applicant's son, aged 13, who had sustained an injury to one of his hands. The liability to pay compensation other than that already paid to the boy was disputed, although the Corporation through Mr. Higson had generously offered to pay a lump sum in settlement.

Mr. Horridge, of Bolton, appeared for the applicant, and Mr. H. J. Cobbett, of Messrs. Aylward & Cobbett, London (Solicitors for The British Clayworkers' Mutual Insurance Corporation), for the respondent.

On the case being called, Mr. Horridge asked to be permitted to withdraw the application for arbitration; he explained that after talking the matter over with Mr. Cobbett, he had come to the conclusion that his client had no legal claim against Mr. Higson, but that gentleman had most generously agreed to pay a further sum of £5 to the injured lad who had undoubtedly been maimed.

Mr. Cobbett agreed to the arbitration being withdrawn, so long as it was distinctly understood that the £5 was not being paid in discharge of any legal obligation, but was a gift by his client.

His Honour said he had nothing to do with any arrangement between the parties, and allowed the proceedings to be withdrawn.

COMPANIES' MEETINGS.

Harrogate Brick Company.—The dividend warrants on the 6 per cent. preference shares and the interest warrants on the 4½ per cent. debentures in the Harrogate Red Brick Company (Limited) for the half-year ending September 30 have been posted.

The Glenboig Fire Clay Company—a Good Year.—The accounts of this company for the year ending August last, after providing for maintenance of works and all current charges, and including £710 18s. 8d. brought forward from the previous year, show subject to completed audit a gross balance of £24,667 18s. 2d. The directors at their meeting to-day agreed to recommend to the shareholders at their annual general meeting to be held next month that the same be disposed of in the following manner:—For depreciation on capital expenditure, £5,000; in payment of a dividend at the rate of 10 per cent., £13,500; to reserve fund £5,000; leaving a balance to be carried forward of £1,167 18s. 2d.—£24,667 18s. 2d.

NEW COMPANIES.

Societe Generale des Ciments Portland Sestao, Limited.—Capital £40,000 in £4 shares. To adopt an agreement made August 31st by Paul Lafarge, for this company, with G. Maurel, and to carry on the busines of cement, brick, tile, and pipe manufacturers. Qualification not specified. Remuneration to be according to profits.

Preston and District Brick and Tile Company, Limited.—Capital £10,000 in £1 shares. To carry on in the township of Cottam, near Preston, the business of brick and tile manufacturers. The first directors (to number not less than three nor more than seven) are to be appointed by the subscribers. Qualification, 100 shares.

Buttington Brick, Tile and Terra Cotta Works, Limited.—Capital £10,000, in £1 shares. To acquire the business carried on by H. H. Treasure, at Buttington, Montgomery; and to manufacture and deal in bricks, tiles, pipes, pottery, etc. The first directors (to number not less than three nor more than seven) are to be appointed by the subscribers. Qualification, 100 shares. Remuneration, as fixed by the company.

Crapper's Brick Company, Limited.—Capital £5,250 in £10 shares, to acquire the business carried on by William Frankish and Marshall Nuttall, as the trustee of the will of Henry Crapper (deceased), and to carry on the business of brick, tile, and pipe manufacturers, &c. The first directors (to number not less than two nor more than five) are to be appointed by the subscribers. Qualification £500. Remuneration as fixed by the company. Registered office: 29, York Street, Sheffield.

Hinckley Wharf Brick, Tile and Pottery Company, Limited.—Capital £10,000, in £5 shares. To acquire the Hinckley Wharf Brick Works at Hinckley, Leicestershire, and to carry on the business of brick and tile makers, &c. The first directors (to number not less than two nor more than five) are B. Ryley and E. Pratt. Qualification, 50 shares. Remuneration as fixed by the company. Registered office: Hinckley, Leicester.

Shoeburyness Brick Company, Limited.—Capital £40,000 in 10,000 cumulative preference shares of £1 each and 30,000 £1 ordinary shares. To acquire, upon the terms of an agreement made by this Company, with W. Weeks and others, certain freehold and leasehold properties at Great and Little Wakering and Barling, in Essex, and to carry on the general business of brick, tile, and pipe manufacturers. There are to be not less than three nor more than seven directors. Qualification, £500. Remuneration to be fixed by the company.

ARTHUR KOPPEL,

PENINSULAR HOUSE, MONUMENT STREET, **LONDON, E.C.**

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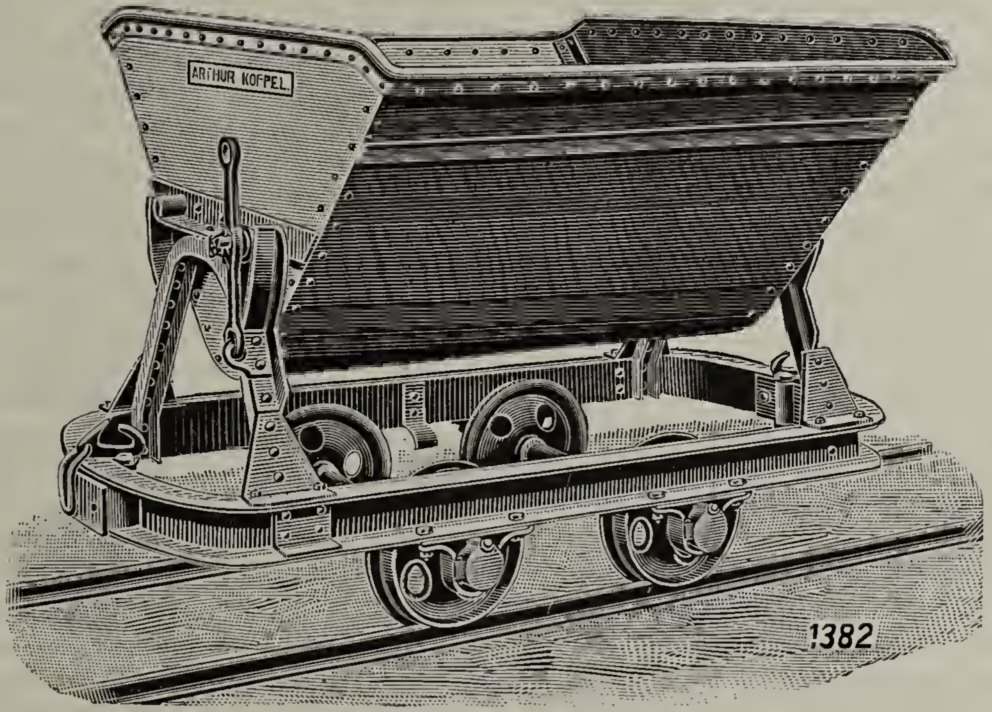

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10 cubic feet, 16in. gauge. 12 cubic feet, 18 and 20in. gauge. 18 cubic feet, 18, 20 and 24in. gauge. 27 cubic feet, 24in. gauge.

"DOUBLE END" AND "ALL ROUND" TIP WAGONS ALSO STOCKED.

GREEN BRICK CARS

FOR TUNNEL DRYING,

MADE BY SPECIAL MACHINERY OF BEST STEEL THROUGHOUT AND ALL FITTED WITH

HARDENED STEEL ANTI-FRICTION ROLLER BEARINGS.

ANY TYPE QUOTED FOR ON RECEIPT OF ENQUIRIES.

STEEL TIPPING SKIPS

(CRANE BUCKETS),

Of Improved Type, made of Steel throughout.

SIZES KEPT IN STOCK:—¼, ½, ¾ & 1 CUBIC YARD.

Gilmour, Morton, & Company, Limited.—To acquire and take over as a going concern the business assets of the firms of Gilmour, Anderson & Co., Kilmarnock, and John Gilmour & Co., Glasgow, and to carry on in the United Kingdom, or abroad, the businesses of coalmasters and fire-clay manufacturers, &c. Capital, £30,000, divided into 30,000 shares of £1 each, whereof 15,000 shall be six per cent. cumulative preference shares of £1 each, and 15,000 ordinary shares of £1 each. Registered Office—188, St. Vincent Street, Glasgow.

Burstall and Company, Limited.—Capital £20,000, in £1 shares. To acquire the business carried on at Kingston-upon-Hull by Jas. N. Burstall and Geo. A. Lambert, under the style or firm of "Burstall and Co." ; to adopt an agreement with John Smith ; and to carry on the business of cement manufacturers, brick and tile makers, etc. The first directors (to number not less than three nor more than five) are : E. Robson (chairman), J. W. Burstall and G. Lambert. Qualification, £200. Remuneration, as fixed by the company. Registered office, Kingston Cement Works, Stoneferry, Hull.

John Board & Co., Limited.—Capital £60,000 in £1 shares. To acquire and take over as a going concern the businesses now carried on at Dunball, Somerset, and elsewhere, under the styles or firms of John Board & Co. and the Dunwear Brick and Tile Company, the first directors, of whom there shall be not less than three nor more than five, are W. S. Akerman, C. W. M. Greenhill, and K. A. Akerman. Qualification, £5,000. Remuneration : W. S. Akerman, £300 per annum ; C. W. M. Greenhill, £150 ; of others to be fixed by the company.

Empress of Gwalia, Limited.—Capital £180,000 in £1 shares. To acquire freehold and other farms, and to carry on the business of brickmakers, builders, &c. The first seven subscribers are—E. Dean, 5, St. Peter's Alley, Cornhill, E.C., 2,000 shares ; F. C. Van Sandau, 13, Cheniston Gardens, W., 2,000 shares ; J. W. Taylor, J.P., 72, Queen's Gate, S.W., 1,000 shares ; S. G. Morrison, 10, Throgmorton Avenue, E.C., 200 shares ; R. Owen, 10, Throgmorton Avenue, E.C., 500 shares ; W. Bulkeley, 30, Lowndes Square, S.W., 500 shares ; F. Lomas, 52, Queen's Gate, S.W., 200 shares. The number of directors is not to be less than three nor more than seven. The first are to be appointed by the first seven subscribers. Qualification, £500. Remuneration, £100 each per annum (an extra £50 for the chairman) and a share in the profits. Registered office, 9 and 10, Pancras Lane, E.C.

Weardale Steel, Coal and Coke Company, Limited.—This company has a share capital of £900,000, divided into 500,000 cumulative six per cent. preferred ordinary, and 400,000 deferred ordinary shares of £1 each, and there is also £400,000 for per cent. perpetual debenture stock. The whole of the preferred ordinary shares, 225,000 of the deferred ordinary shares, and £300,000 of the debenture stock has been offered for subscription at par. The debenture stock, in the event of a voluntary winding up, will be paid off at the the average selling price for the six months preceding the liquidation—in any event, at not less than 110. The preferred ordinary shares are entitled to a cumulative dividend at the rate of 6 per cent. per annum payable out of the profits which in respect of each year the company shall determine to distribute, and to one-half of the residue of such profits after payment of a non-cumulative dividend of 6 per cent. on the deferred ordinary shares. The company is formed to take over the business of the Weardale Iron and Coal Company, Limited, ironmasters, brickmakers, &c., of Spennymore, in the county of Durham, and elsewhere. The purchase money for the whole of the shares in and debentures of the old company has been fixed by Sir Christopher Furness (the vendor), who is selling at a profit, and who is also the promoter of the company, at the sum of £1,025,000, payable in cash, or (in order chiefly to satisfy an option in his contracts with the shareholders in the old company), partly in cash and partly in shares, at his option.

TRADE NOTES.

Emigrants in 1898.—According to the statistical tables compiled by the Board of Trade from information officially furnished to that Department, it appears that in the year 1898 the emigrants of British and Irish origin who left our ports included 28 brick and tile makers, potters, &c. ; 545 bricklayers, masons, plasterers slaters, &c., and 214 builders.

Death of Mr. Reginald Meakin.—On Saturday morning, October 7th, Mr. Reginald Meakin, second son of Mr. Alfred Meakin, of Henshall Hall, Congleton, died after a brief illness, and the news of the sad event was received with much regret in the town, where he was deservedly popular amongst his firm's employés and the townspeople generally. The deceased, who was only twenty-three years of age, was one of the directors of the firm of Messrs. Alfred Meakin and Sons, of the Albert and Victoria Potteries, earthenware manufacturers, and had the management of the last-named works. He was actively engaged in business until three weeks ago.

Foreign Cement in England.—The London Chamber of Commerce calls attention to the fact that large quantities of foreign cement are now imported into the United Kingdom, including some of very poor quality, adulterated with slag. It is often sold to buyers as English Cement, and bears the name of "Portland," often without any indication that it is made abroad. Some of the English makers have asked that the authorities should forbid the importation of this foreign cement, until the bags bear a title or mark that will enable the consumer to know that the cement is made abroad. The request seems a reasonable one, for at least the foreign article ought to be sold for what it is.

New Cement Works at Cambridge.—Messrs. Keeble Brothers, the enterprising brickmakers of Peterborough, whose name will be recognised in connection with the New Peterborough Brick Co., Ltd., the Saxon Brick Co., Ltd., &c., &c., are now erecting at Cambridge one of the largest and what are likely to be the most modern equipped cement works in England. The Saxon Portland Cement Co., Ltd., is situated on a splendid area adjoining the G.E.R. main line, and to cope with the now enormous demand for a first-class material, the newest and most efficient plant is being put down to turn out a weekly average of 500 tons, with arrangements to further increase to an output of 1,000 tons of Portland cement per week. Mr. A. C. Davis, who, it will be remembered, has before had the supervision of large cement and brick works in this district, is the managing director of the new company.

The American Blower Company, 70, Gracechurch Street, inform us that they are extremely busy in their brick dryer department. They have dryers working from 10,000 to 100,000 daily production each ; and have the following orders in hand for complete A.B.C. brick dryers, in all cases including the entire equipment of steel cars as well as the drying system :—Messrs. Hall & Boardman, Limited, West Bromwich ; Brill Brick and Tile Company, Limited, Brill ; Dunmore, Limited (second dryer), Irthlingboro' ; Metropolitan Brick Company, Limited, Irthlingboro' ; Midland Brick Company, Limited, Wellingboro' ; and Jees Hartshill Brick Company, Limited, Atherstone ; besides numerous Continental orders for similar brick dryers. They are also furnishing complete equipment of brick dryer cars to the following, among others :—Albion Brick Company, Limited, Blyth ; Callendar Coal Company, Limited, Falkirk ; Mr. W. Cunliffe, Kingston ; Messrs. T. Carr & Sons, Newcastle ; Messrs. Prestage & Company, Broseley ; and they are shipping very large numbers of their cars to Continental brickmakers.

Messrs. C. A. Zadig & Co., of 11, Queen Victoria Street, E.C., have been awarded a silver medal for their Portable Railway Plant, at the Greater Britain Exhibition, Earl's Court.

Killed on the Line.—Whilst a brick burner named Thurston, was going to the works of Messrs. Watts & Co., of Cambridge, late in the evening to attend to his duties, he was knocked down by a train and cut to pieces. He had endeavoured to reach the kilns by a short cut.

Brickworks Fire near Kilmarnock.—Early on Sept. 28th, a serious fire broke out at Bonnyton Fireclay Works, Kilmarnock, belonging to Messrs. Gilmour, Morton & Co. It originated through the overheating of stoves, and three drying sheds were totally destroyed. The damage is estimated at £1,000, and is covered by insurance. The works being situated outside of the burgh, there was no water plug at hand, and the burgh fire appliances were of no service.

The Scotia and Sneyd Green Brick Co., Ltd.—Mr. John B. Davis, who in 1889 took over Walker's old established Brick and Tile Works, Brownhills, Tunstall, is leaving it to take over the entire management of the works belonging to the Scotia and Sneyd Green Co., Ltd., who, in addition to an excellent common brick plant, are contemplating putting down at once a red brick plant, and shortly opening out their Scotia Field. Mr. Davis will be remembered as many years at "Peakes," Tunstall, and we wish him every success in his new venture.

Ancient Tile Discovery at Dorchester.—While some workmen were engaged in making excavations on a building estate on the western side of the town of Dorchester, they came upon an ancient Roman pavement of unusual size, and in an almost perfect state of preservation. There are representations of vases and other figures, and the colouring of the tesseræ is almost as bright as when the pavement was laid down, perhaps 1,500 years ago. Owing to its size, it was at first conjectured that it was the flooring of a temple; but experts who have seen it are agreed that it was a domestic building—probably a villa of a superior class. It is outside the old Roman walls, and not far from the splendid amphitheatre for which Dorchester is noted.

A Stourbridge Brickmaker's Will.—Probate of the will dated May 22, 1897, of Mr. George Pearson, of Thornhill, Old Swinford, Stourbridge, fire-brick manufacturer, who died on the 19th July last, aged 77 years, leaving personal estate valued at £9,929 11s. 6d., has been granted to his son, Albert Henry and to Henry Perry, both of Stourbridge, fire-brick manufacturers. The testator bequeathed to his wife, Mrs. Margaret Pearson, £250, the use and enjoyment of "Thornhill," with its contents, and the income during her life from his one-third share in the partnership of Mobberley and Perry, fire-brick manufacturers, which share, subject to Mrs. Pearson's life interest, is left in trust as to one-fourth each for his son, John Thomas Pearson, and his daughters, Phœbe Louisa Perry, Esther Jane Everett, and Alice Elizabeth Grazebrook. He bequeathed to each of his said children, £250, and to his son, Albert Henry Pearson, £250, and the testator's half-share in the business of Harris and Pearson, subject to his paying thereout within ten years, £3,500 to his brother, John Thomas. He devised his real estate at Amblecote, Brierley Hill, and Kingswinford, to his said three daughters, and he left "Thornhill," subject to Mrs. Pearson's life interest, equally between his said two sons. The testator expressed a wish that the business of Mobberley and Perry should, if possible, be transferred to a limited company. The late Mr. Pearson left the residue of his estate as to £250, for his said daughter, Alice Elizabeth Grazebrook, and the ultimate residue in trust, in equal shares, for his said two sons and three daughters.

Sanitary Exhibition at Southampton.—This Exhibition, which has been held in conjunction with the Sanitary Institute, was opened on the 5th of last month. Many leading manufacturers of Sanitary specialities exhibited; amongst whom were the following: Messrs. Doulton and Co., and Geo. Jennings, of Lambeth; The Albion Clay Co., of Burton-on-Trent; Jos. Cliff and Sons, Leeds; Messrs. Oates and Green, Halifax; Messrs. J. Duckett and Sons, Ltd., of Burnley. Three medals were awarded to the Albion Clay Co., two medals to Jos. Cliff and Sons, and bronze medals to Messrs. Doulton and Geo. Jennings respectively.

Brickmaking in China.—From Kiao-chow we learn that building is going on everywhere, while sanitation is not neglected, for the authorities are constructing concrete drains, some of them 7 feet high, so that a man can walk upright in them. The whole place is very busy and houses hard to get. A second big brick kiln, capable of turning out six to eight million bricks annually, has been constructed on Chiposan Island. But though the weather is fine, building goes on very slowly owing to the want of coolies. Thousands of coolies left before the rainy season set in, and those that stayed are asking for an advance of 33⅓ per cent. in wages.

Cambridge Cement Making.—At the invitation of Mr. T. Coulson, Chairman of the Board of Directors of the Romsey Town Cement and Lime Company, Limited, a small party of ladies and gentlemen, directors and shareholders of the company, visited the Cement Works, Mill Road, recently and saw the cement in all its stages of production. This flourishing business formerly belonged to Messrs. Thoday & Co., Limited, but in the early part of this year was transferred into the hands of an independent company. Perhaps not many people of Cambridge know what a large amount of cement is exported daily from the town. Most of those who visited the works under the excellent and interesting guidance of Mr. T. Coulson, and the Managing Director, Mr. Walter C. Gibbs, seemed surprised at the busy scene they saw. But it is the same every day. Any time these eleven years they might have seen the marl being dug from the pits, and the refined powdery cement being carted away, not 50 yards from the quarries, all day long. And it is likely to continue for many a year to come, in spite of the ever increasing demand for the cement. The exploitation of three-quarters of an acre has occupied all but a dozen years, and there are five acres to be dug out. Moreover when the cement marl has been removed and used there is beneath a substantial stratum of coprolite, and beneath that a deep layer of blue gault, running down to the rock some 50 feet or so lower down. A visit was made to the pits, where men were seen digging the marl and placing it by ton loads in an iron trolley. This ran down an incline to the deepest part of the pits and was there hoisted by a steam crane, which also conveyed it to the kilns. It was interesting to notice the different strata. At the surface were six feet of callous earth, useless except for filling in; under this was a small bed of hydraulic limestone, and then 22 feet of good cement marl, then being excavated, and between the marl and the yet undefined depth of blue gault was to be seen a bed coprolite. From the pits the party went to the kilns, first inspecting three cement kilns just built and hitherto unused. It has been found necessary to add these to the ten old kilns—nine cement and one lime—in consequence of the largely increased demand for the cement. The visitors then examined the working kilns, going down dark subterranean passages to the fires below and seeing all the inner mysteries of the smoking kilns. After this they inspected the engine room and grinding machine, where they saw the fine powder being deposited into sacks ready for exportation. The storing rooms were comparatively empty and several of the guests seemed surprised at this. But the company have only one trouble, the demand for their produce is larger than the present supply, and that accounts for the lack of store. When the three new kilns are in use the supply will naturally be greatly increased.—*Cambridge Gazette.*

New Brickworks at Scarborough.—The Governors of the Scarborough United Scholarships Foundation have disposed of their two fields in Scalby Road, Scarborough, for the sum of £2,000, to Mr. Henry Walker, of the West Cliffe Saloon, Whitby, who, we understand, intends erecting brickworks on the land. Mr. Walker, it may be added, has during the last few days opened his new brickworks in Stockton Lane, York.

Will of a London Potter.—The will and codicil (both dated July 13, 1899), of Mr. William Stiff, of the London Pottery, Lambeth, and of The Laurels, 61, South Side, Clapham Common, who died on July 19, were proved on Sept. 11 by Sydney James Stiff and Horace William Stiff, the sons and executors, the value of the estate being £45,464. The testator gives £400 and all his interest in the London Pottery to his son Sydney James; £200 and an annuity of £600 during widowhood, or of £300 should she again marry, to his wife, Mrs. Anne Louisa Stiff; £50 to the Rev. Mr. Williams, of Upton Chapel, Lambeth; £100 each to Miss Sarah Hall, James Baxter, George Walter Wilkins, and James Sheen; and £50 to Alfred Mitchell. He directs that the property coming to him under the will of his father, subject to the life interest of Mrs. Lucy Stiff, shall be divided among his surviving children. The residue of his property he leaves as to six twenty-fourths each to his sons, Horace William and Alfred Thomas, and three twenty-fourths each to his daughters, Ethel Mary, Hilda Sarah, Mary Helena, and Eleanor Winifred.

The Carriage of Earthenware.—At the quarterly meeting of the North Staffordshire Chamber of Commerce, a letter was received from Messrs. L. Finney & Co., manufacturers' agents, London, with reference to the difference in the rates for the carriage of earthenware packed in casks or crates, and earthenware packed in hampers, boxes and cases. They stated that the Great Western Company's quotations from London to Aberystwith were "earthenware in casks or crates 49s. per ton, including cartage within the company's usual limits; earthenware in hampers, 62s. 3d.; earthenware in boxes or cases, 74s. 11d." They expressed the opinion that earthenware stood less risk of breakage when packed in cases than when packed in crates, and therefore they were quite at a loss to understand why any difference whatever should be made in the rates. Almost all Continental china and earthenware were packed in cases and carried at a ridiculously low rate as compared with what was charged locally, and the injury done to the British trade in consequence, could not be fully realised, or doubtless this state of affairs would long since have been remedied. Although the quotation given referred to one station only, the same system of rating equally applied to all stations, including the Staffordshire Potteries, to London. Messrs. Doulton and Company, Burslem, also wrote on the same subject, expressing the opinion that the insistence by the railway company on a higher rate for cases, and boxes especially, was a great hindrance to business.—The Chairman said the railway companies were quite within their right in charging these different rates. He did not know whether the rates quoted were exceptional or ordinary rates, but from the Potteries to most stations there were exceptional rates. He did not think the exceptional charges unreasonable, and, as they had been so recently fixed, it would be a matter of concession if they got the North Staffordshire Railway Company to alter them. Where special rates were arranged it was entirely at the option of the company. Mr. H. Boddington said if there was an anomaly the remedy was easy—the goods might be sent by water carriage. After discussion it was decided to refer the matter to the Railway Rates Committee, to interview the North Staffordshire Railway Company, with a view to inducing them in their next classification to so alter their rates as to remove the anomalies complained of.

Forthcoming Sale of Property.—On Friday, the 20th inst., the Brickfield, Building and Plant, known as the Cross-Roads Brick and Tile Co., Brill, Bucks, will be sold by auction at the Mart, Tokenhouse Yard, E.C. For further particulars see advertisement pages.

Fire at a Cement Works.—The engine-house and pumping shed at Messrs. Francis & Co.'s Nine Elms Cement Factory, Cliffe, have been destroyed by fire. The outbreak occurred through the bursting of a large flare lamp, and it was at one time feared that the manager's house and other buildings would become involved. Fortunately, there was a good supply of water, and the Rochester Volunteer Fire Brigade, who attended, succeeded in confining the flames to one building.

The Smoke Question.—At the County Court, Birmingham, before his Honour Judge Young, Thomas Hough, of the Lodge Farm, Goscote, claimed £27 8s. from Messrs. John Hough and Son, Heath End Brickworks, Goscote, in respect of damage alleged to have been occasioned by reason of the defendants permitting smoke and noxious fumes to escape from their works, whereby the same had become a nuisance to the plaintiff, and injurious to his land and crops. Plaintiff also claimed an injunction restraining the defendants from carrying on their business so as to be a nuisance to him. After several witnesses had been called, there was a consultation between the parties, and it was announced that the action had been settled, but the terms were not stated.

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The Proprietors cannot recognise any conditions in accepting Orders unless these are stated upon their Printed Order Forms.

Cheques to be made payable to H. GREVILLE MONTGOMERY, and crossed *London and Westminster Bank*, Temple Bar, W.C.

The Annual Subscription is 7s., post free, Single Copies 8d.

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I. Was formed as a protest against the high rates charged to the trade.
II. Can still give quotations as low as any other company.
III. Is prepared to carry any risk and has ample funds at disposal.
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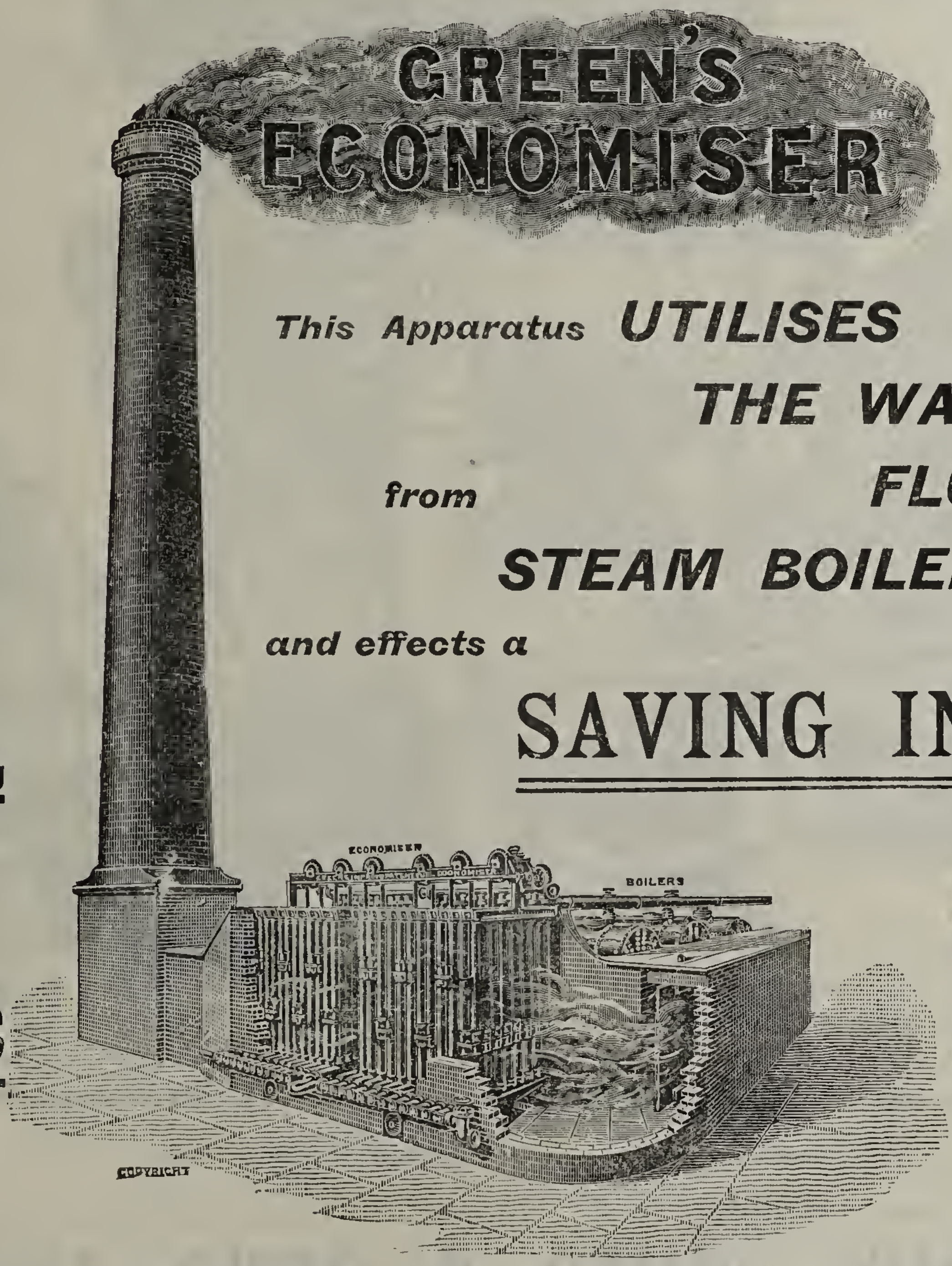

Green's Modern Economiser as applied to a Steam Boiler Plant.

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OF THE PRINCIPAL

BRICK,

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WORKS

Throughout the Country.

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This Apparatus **UTILISES THE WASTE** from **FLUE GASES STEAM BOILERS,** and effects a

SAVING IN COAL

FROM

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Per Cent.

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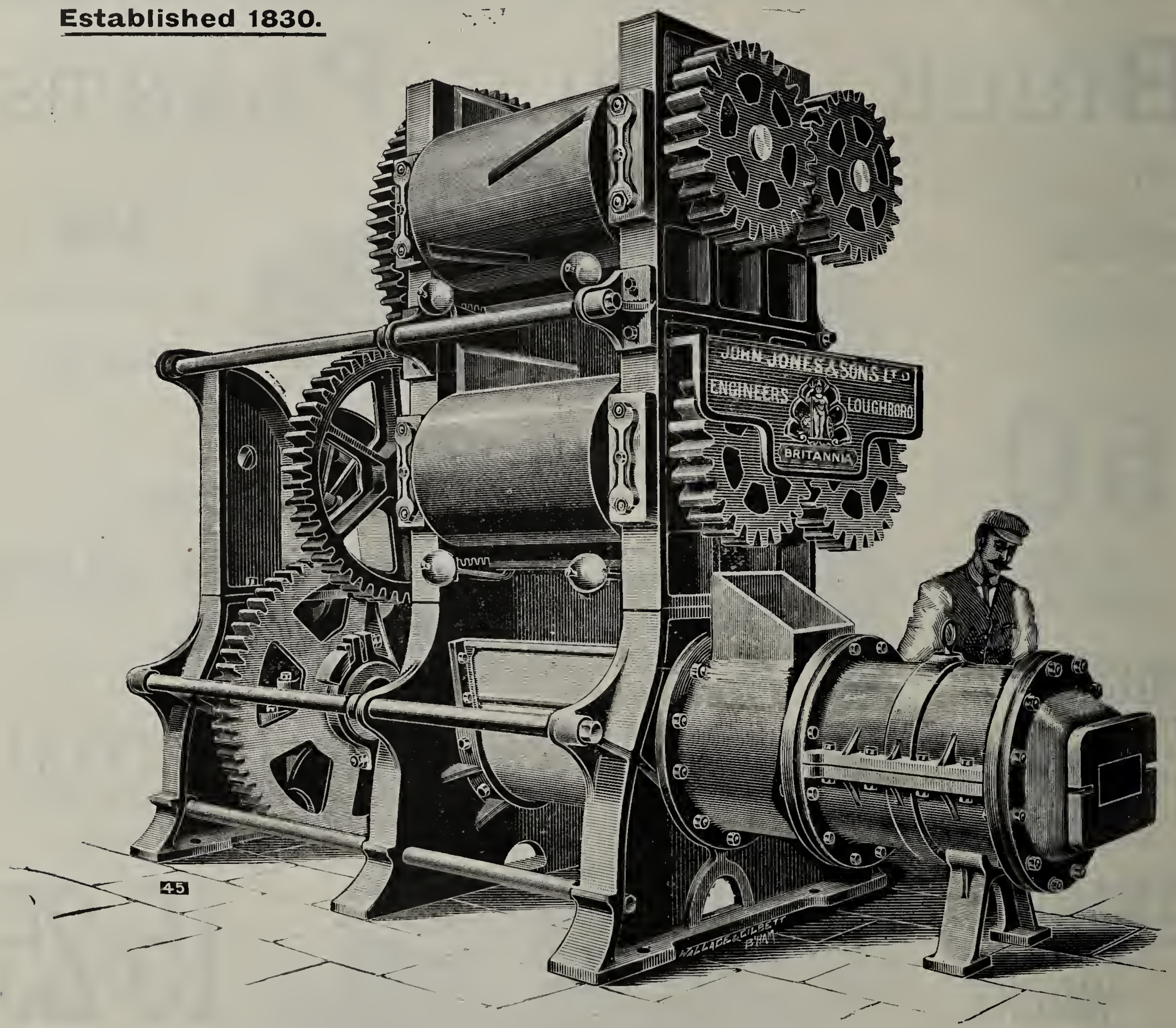
Established 1830.



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Millwrights,
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MIDLAND MACHINERY WORKS,

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All Goods Offered subject to being Unsold.

BRICKMAKING MACHINERY FOR SALE CHEAP.

STEAM POWER MACHINES—

New Improved Brickmaking Machine, for steam power, with Vertical Pugmill, of strong cast-iron sectional plates (can be made of steel plates if desired at a slight extra cost), complete, with expression rolls, lubricating brick die, cutting-off table, &c. This machine has double purchase spur and bevel gearing, and the expression rolls are driven direct from main shaft by spur gearing. It is mounted on strong cast-iron bed plate, and is fitted with my Improved Cast Steel Knives, and improved adjustable top thrust bracket.

One No. 0 Murray Machine, with expression rolls, as good as new, in stock at Northampton.

No. 7a Brickmaking Machine by Whitehead, with rolls overhead, and hoisting gear, cutting-off tables, &c., complete.

Large Screw Quarry Press by Pullan and Mann.

Two Gill's Patent Presses, one with engine.

"Eclipse All" Brickmaking Machine by Scholcfield, with press complete.

Scholefield's Semi-Dry Machine and Press, complete.

Portable Brickmaking Machine by Bedford Iron Co., horizontal pug, mouthpiece, die, and cutting-off table, complete.

Second-hand Bedford-type Machine, with expression rolls, cutting-off table, die, &c., complete; used very little.

Set Expression Rolls, gearing, housings, mouthpiece, &c., all complete.

Vertical Pug Mill, all iron, for steam power.

Several sets Hoisting Gear.

Bawden's Pugging and Moulding Machine, for Steam Power.

Clayton Howlett & Co.'s Washmill and set of Elevators complete.

Clayton Howlett & Co.'s "one process" Brickmaking Machine, complete with die and table.

HAND AND ANIMAL POWER MACHINES—

No. 4 Hand Power Pipe and Tile Machine, Bedford Iron Co. type, complete with cutting-off table.

No. 3. Ditto ditto

Several Vertical Pug Mills for animal power.

Brickmaking Machine, consisting of vertical pugmill, die, and cutting-off table, for animal power.

Improved Hand Brick Press, with screw action from below.

CLAY PANS, &c.—

5 ft. 6 in. Under-driven Pan, rolls 2 ft. 6 in. diam., by Mason Bros.

7 ft. 0 in. Over-driven Pan, all complete, new. Weight 7 tons 10 cwt.

9 ft. Perforated Pan, complete, and in excellent order; over-driven.

9 ft. Under-driven Mortar or Clay Pan, rolls 42 in. × 17 in.

GENERAL ACCESSORIES FOR BRICKYARDS—

Second-hand relayable Rails, 12 lb., 14 lb., 18 lb. New F.B. Rails.

100 yds. Portable Railway, 2 ft. g., consisting of steel flanged rails, 14 lbs. per yard, and steel sleepers with clips, pressed out to receive rails, and made expressly for this section of rail.

Wrought iron and steel Brick Trucks to carry 120 bricks each.

New Wheeling Plates, 6 in. × ¼ in., in stock.

New Barrows and Clay Wagons. List on application.

Specially prepared Brick Oil that will not destroy the colour of bricks.

Best Sheffield Piano steel wire.

Best quality Fustian for lining dies.

Hand, Horse Power, and Steam Pumps.

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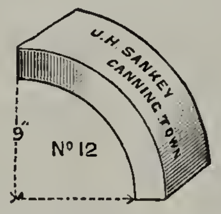

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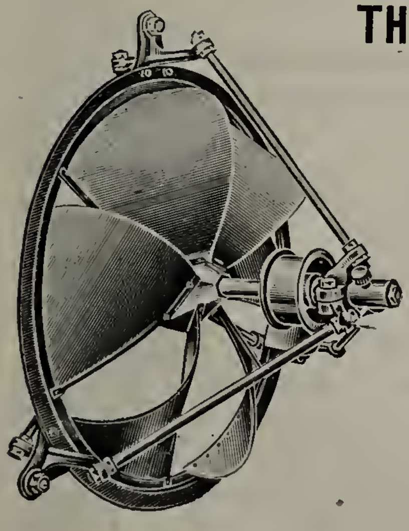

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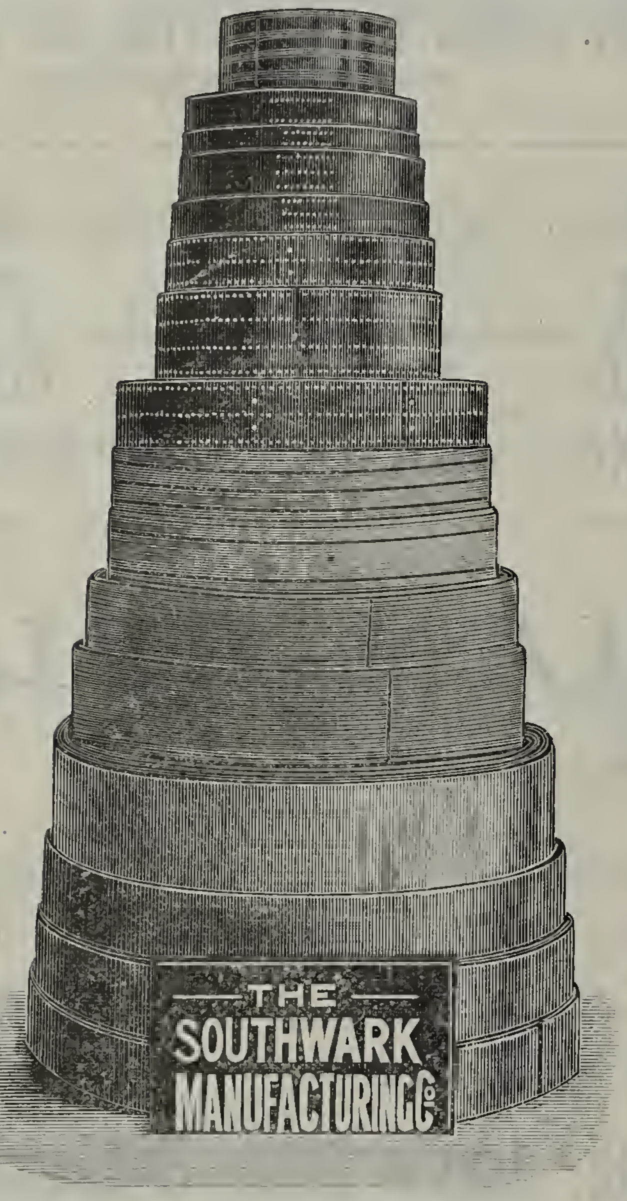

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BOILERS, Lancashire—20 × 6, 25 × 7, 28 × 7.
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48 PORTABLE ENGINES, from 2½ h.p. to 30 h.p.
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Important to Brick Manufacturers and Contractors.

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"ANNULAR" KILN

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Most simple construction, uniform, beautiful and good burning; most rational utilisation of the heat; output from four to ten million bricks per year with only one fire; extraordinary high savings.

For particulars apply to the undersigned firm, where also a kiln may be seen at full work.

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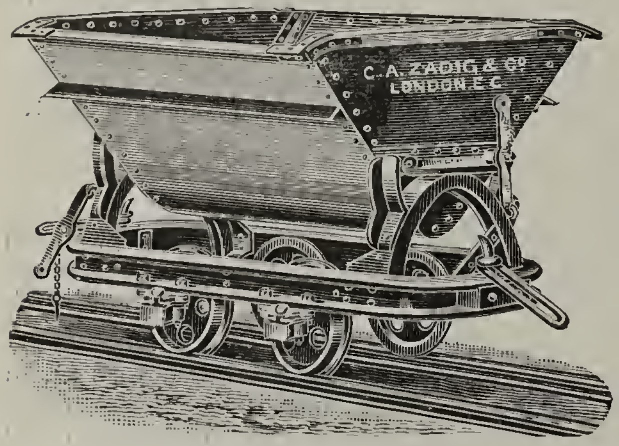

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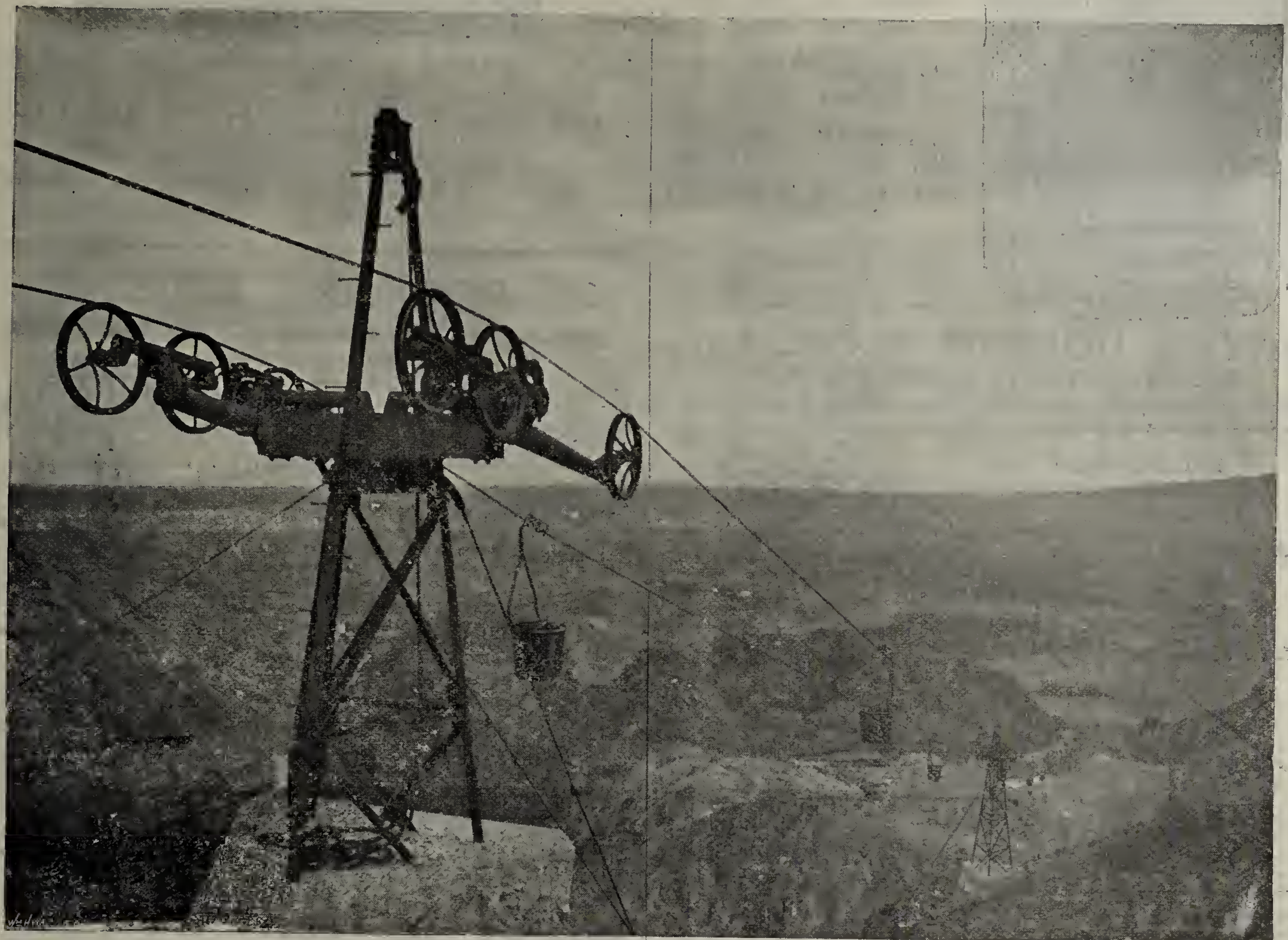

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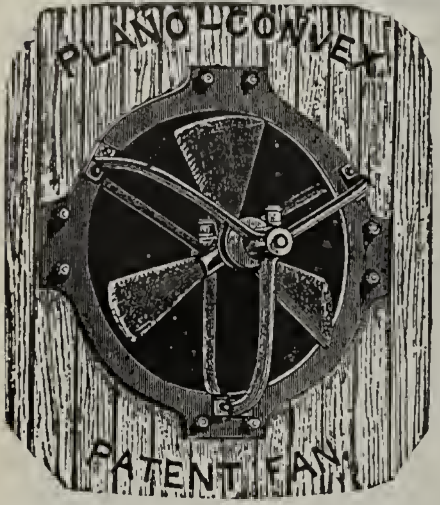

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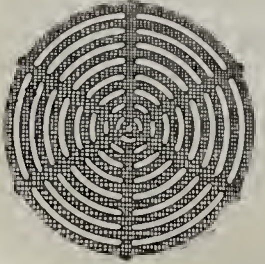

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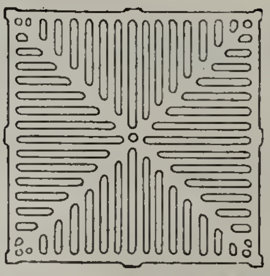

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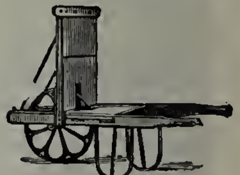

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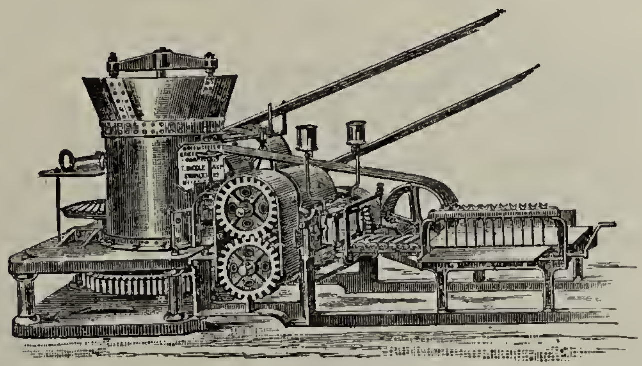

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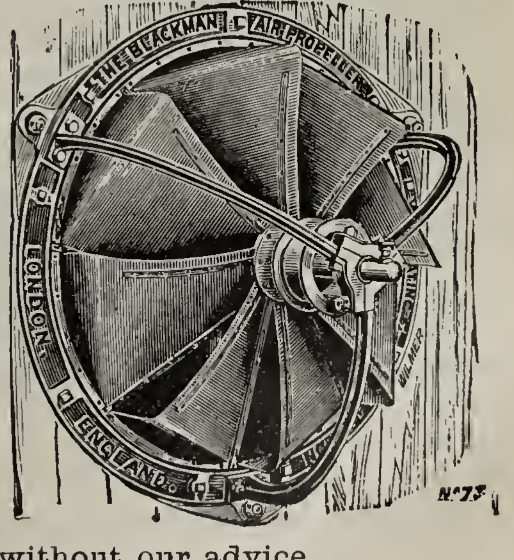


N.B.—We are not responsible for results when our Plant is used without our advice.

BY THE WAY.

BRICKMAKERS served particularly by the Great Eastern Railway, have during the past month been experiencing a rough time in not being able to get their bricks delivered into London. A few weeks ago the fog was alleged as an excuse, now the Company is obliged to admit that it has got its goods department into an inextricable muddle. It is no joke to have one's orders shunted on to a siding for a month, and the only consolation—a poor one, we admit—is that the block did not come when the demand for goods was at its highest. As to truck accommodation, this is not confined to one line alone; all through the country it is impossible to get trucks sufficient to carry on business, and the outcry is becoming serious. It is time the Institute had a deputation with someone!

* * *

IT gives us pleasure to note that the esteemed Solicitor to the Institute of Clayworkers has been appointed to fill a similar office for the Master Saddlers' Federation for the United Kingdom. At the same time we can only hope that, for Mr. Bird's sake, the office is not an honorary one, or if it be, that the Saddlers are a more litigious, and less law abiding, body of men than ourselves.

* * *

THE recent Brewers' Exhibition calls attention to the fact that many attempts have been made during the past three or four years, by our leading manufacturers of pottery, to put a reliable bottle or jar, and tap combined, on the market, suitable for the delivery of beers, wines, spirits, etc. This is in order that the brewer or distiller may supply, say, a 2-gallon jar of liquor ready tapped for the customer's use. This has not up to the time of writing been really accomplished in a manner satisfactory to the buyers or users of the wares. Whatever the design it must be allowed that any large projection is an element of weakness, since the tap with the bottle must of necessity stand fairly rough usage, incidental to filling, storage, packing, cartage, and to the general handling of the bottle and tap combined when full; and there must be no chance of leakage. The arrangement must of course be simple and cheap, not easily disturbed or broken, and ready for immediate use. This is no mean problem for clayworkers to solve.

* * *

DR. R. W. JOHNSTONE has recently issued a report on an inquiry he held last July into the causes of an outbreak of diphtheria in the Eton Rural District. Brickmaking is largely carried on in the neighbourhood, and there are several unsatisfactory features in the sanitary arrangements of the villages to which Dr. Johnstone directs attention. It was suggested to him that one cause of danger was found in the deposits of London house refuse made at Langley Marsh. Naturally he thoroughly investigated these deposits and their surroundings. His report goes carefully into every detail, and in reviewing the whole facts, he concluded that there seemed little indication that persons had come by diphtheria infection as a result of direct association with infectious matters in the heaps. But it may be conceded that there is general ground for believing that emanations of decomposing organic matter may be capable of producing sore throat and lowering the vital resistance, and of thus predisposing to diphtheria. "There can be no question," says Dr. Johnstone, "that from time to time, under favourable conditions of temperature, wind, and disturbance of the heaps (by sifting or unloading), emanations were given off during the summer of 1898. But whether in the past year the dust heaps did thus indirectly conduce in large or in small measure to that diphtheria prevalence which residents in the neighbourhood sustained in common with residents in other parts of the district, the facts at disposal did not suffice to show."

* * *

IN his consular report on the trade of Germany during last year, Consul-General Schwabach draws attention to a new manufacture of tiles obtained from slag. The slag in a liquid state is conveyed into a large receptacle, in which it is mixed with water. To this mixture lime is then added, and the stuff is then taken by means of pipes into wooden boxes; these are taken back to the tile sheds, where the stuff is pressed, and formed into tiles and dried by steam. The tiles are grey in colour, and are remarkable for their durability, being specially suitable for buildings whose foundations are in damp ground, for tanks, reservoirs, &c.

* * *

THE election of Mr. J. Rogers to the mayoralty of Truro is a distinct recognition, not only of personal worth and business capacity, but of what the capital of Cornwall owes to the successful working of a great business enterprise. The new mayor is the head of the firm of Rogers and Co., china-clay and stone works, Truro, one of the principal industries of that Cathedral City. Up to quite recently the staple industry of Cornwall (tin) was under a great cloud of depression, and the employment for miners was slack, which gave rise to much consequent hardship, if not actual distress.

* * *

Contrasted with tin, china-clay has been exceedingly flourishing in Cornwall, and to no firm in the country is the development of the trade in this direction more due than to Messrs. Rogers and Co., and particularly to Mr. J. Rogers. Their push and enterprise has led to great developments in china-clay, both in the quantity and character of the output. It is therefore exceedingly fitting that Mr. Rogers, to whom the city is so much indebted, should be accorded the highest civic honours, whilst it may be said with equal truth that Mr. Rogers owes a great deal to Truro, and is seeking to pay it by distinguished service to the local state. We trust that the new Mayor of Truro may have a successful and pleasant year of office.

* * *

WE heard a good tale the other day. A lecturer was giving advice as to the careful opening of the kiln after the bricks had been burnt. "Let them remain at least a day in the kiln after the fire has gone out," he said. "No cracks will then be developed unless the clay has not been carefully prepared, or the fire too rapidly withdrawn." A member of the audience said he thought that was good advice. He was present "when the contents of a certain kiln in Shropshire was being drawn, and the bricks were placed red-hot in a cart." He then sat down without further comment. But, a persistent enquirer was not to be baulked—he wanted to know the result. The other man then stated that the "bricks burnt the cart and fell out, and the cart burnt the horse which was lamed, and put the driver on the sick list." "How were the bricks put in the cart?"—But the learned one had gone!

THE BRICK-EARTHS OF GREAT BRITAIN.—XXVIII.

Stamford District.—*Continued.*

The section at Lumby's old terra-cotta works is recorded, as follows:—

1. Rubbly Oolite (in patches).
2. Brown Sand, of irregular distribution.
3. "Terra-cotta clay," sandy, of light blue colour, from 1ft. to 4ft. in thickness.
4. Ironstone rock, 8ft. to 13ft.
5. Upper Lias clay, very thick.

Mr. Lumby has ascertained that bed No. 3, the most interesting from a clayworker's standpoint, is composed of almost pure silicate of alumina, with a little free sand in very fine grains; sandy lumps found in the clay were ground up with the clay in the mill. The admixture of the clay with fine sand improves its quality; and the Geological Survey says that mixed with a very small quantity of the white clay from Poole, these clays of the Lower Estuarine Series make an excellent terra-cotta.

Upper Lias Clay.—We have described the general character of this clay in this part of England in a previous article. In the Stamford district it is brought to light by the kindly action of the great fault already alluded to in the last article. At Tinwell, Easton, and along the southern slopes of the valley of the Welland, south of Stamford Station, this clay has an extensive outcrop. All through Easton Woodside, southwards beyond Collyweston, and again at Ketton, this clay is traceable. The junction of the Northampton Sand with the Upper Lias Clay forming the channel of the Welland is seen at Easton, and very copious springs of water are given off at the base of the ironstone.

The Oakham District.

There is a wide range of materials in this district, and much of them is suitable for the making of excellent bricks. It will be seen from our sketch map (based on that issued

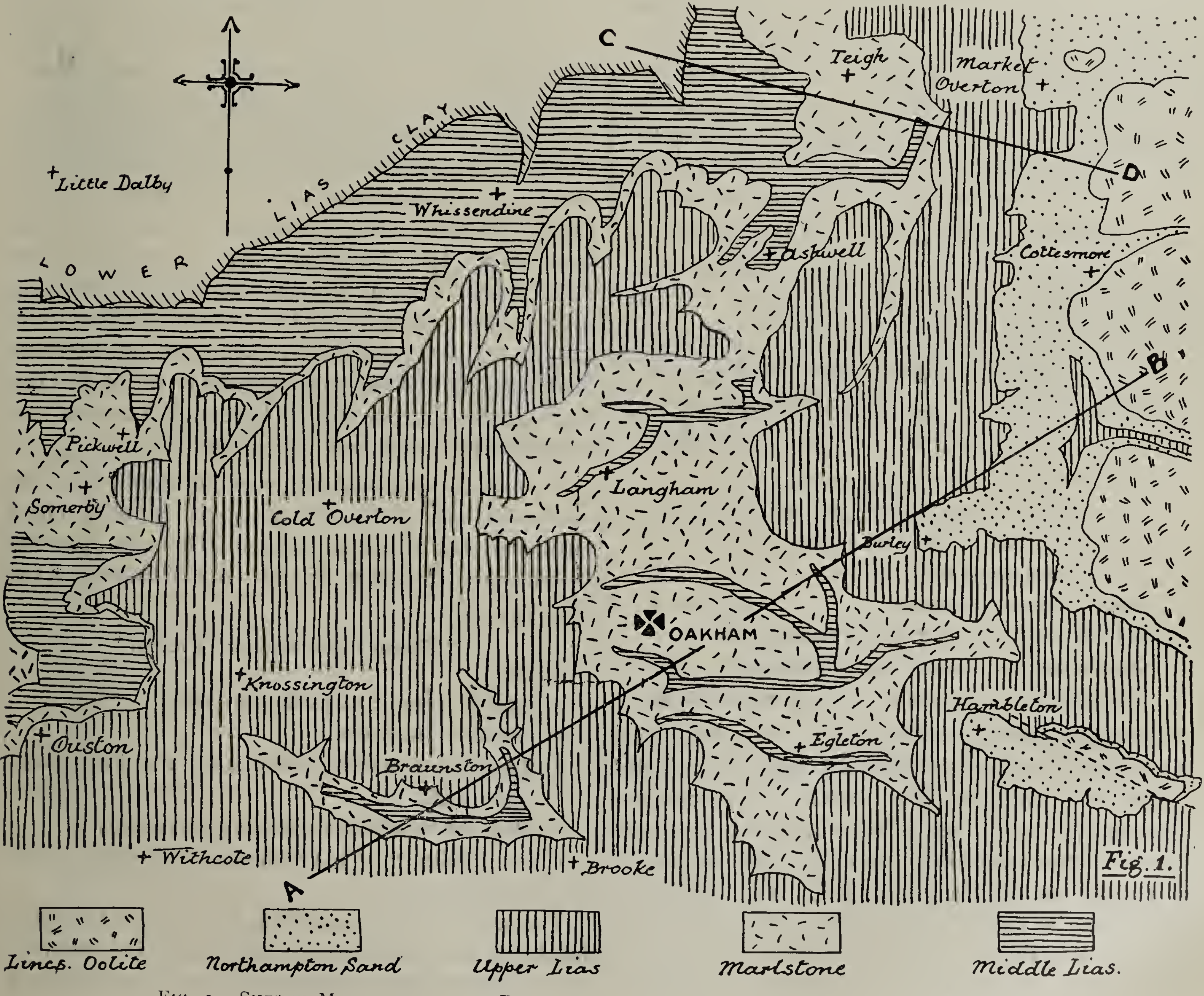


Fig. 1.

Fig. 1.—Sketch Map shewing the Distribution of Brick-Earths in the Oakham District.

by the Geological Survey) that the town of Oakham stands on the Marlstone Rock-bed of the Middle Lias, which formation crops out for several square miles to the north-west and south-east of the town, as well as at the village of Braunston, and in a continuous straggling outcrop from Somerby by Pickwell and on to Whissendine, Ashwell, and Teigh.

The divisions of the Middle Lias, recognised by Professor Judd in and about the district, are:—

1.—Marlstone Rock-bed, which is a more or less ferruginous limestone passing in places to a good ironstone. The rock is often crowded with fossils, and, locally, bears considerable lithological resemblance to the Northampton Sand. As will be gathered, the Rock-bed is very variable both in thickness and mineralogical character. It is especially well developed in the vicinity of Tilton on the Hill (some three miles west of Withcote) and at Somerby (see Map). At Tilton it is about 19ft. in thickness; towards the east and south, however, it thins out very rapidly, and at Oakham is only from 8ft. to 9ft. in thickness, still dwindling away towards Alexton and Horninghold. With diminished thickness the bed sometimes loses its calcareous character and passes into a sandy deposit. This deposit is not of much interest to the clayworker, though it might be judiciously employed in districts to vary the tints of the normal products of other clay beds near.

2.—The light Blue clays of the Middle Lias immediately underlying the Rock-bed are well exposed in several brickyards in the district. A brickyard a little north of Oakham yielded the following section:—

Brickyard Section at Oakham.

		ft.	in.
a. Marlstone rock-bed	thickness not seen.		
b. Soft, brown, sandy bed		1	0
c. Hard, shaley, micaceous clay, having a layer of ferruginous nodules near the top, and others scattered through the mass; pyrites abundant towards the base, say		10	0
d. Sandy blue rock (worthless)		1	6
e. Light-blue clay, sometimes good enough for tile-making, at others full of ferruginous nodules, etc., and worthless ...	to bottom of pit.		

In reference to the above section, it will be noticed that the lithological character of the beds is extremely variable, and one would hardly call it an ideal set of materials for clayworking purposes. Yet, in bed *e* we find a great deal of most excellent earth locally developed in the pit, especially towards the middle of the bed. The tiles made therefrom are of good quality, and the clay is noteworthy as not shrinking very appreciably in the kiln. Were it not that so much of the other material found is of so little use, this bed *e* would certainly find more favour in the district. The hard, shaley, micaceous clay (bed *c*) is good for brickmaking also, but to get the best results the ferruginous nodules alluded to must be removed. Fortunately, the hard nature of the shaley clay is not averse to a little more iron, which acts as a species of flux to it in the kiln, but, of course, too many nodules must not be permitted to remain, even if they are reduced first by being ground in the pan.

There is another brickyard in this deposit to the south of Oakham, on the way to Uppingham, recorded as follows by the Geological Survey:—

Brickyard Section, South of Oakham.

		ft.	in.
a. Marlstone Rock-bed at top of the pit, containing numerous hard, rounded and flattened concretions of ferrugino-argillaceous limestone	thickness not seen.		
b. Clay containing large quantities of iron pyrites, say		9	0
c. Two beds of thin and very variable, soft, sandy, ferruginous rock	few inches.		

One would hardly call this an ideal brickmaking material; still, some good serviceable bricks have been turned out.

3.—Beds of blue clay with septaria, already alluded to as occurring in the brickyards at Belton (see *ante* p. 167). To the south-west of the Oakham district, and about 7 or 8 miles west of Uppingham, we find at Hallaton brickyard nodular ferruginous beds alternating with blue, micaceous, sandy clays. Dark blue clays were formerly dug underneath these. In a pit between Keythorp and Hallaton, Professor Judd records a few feet of the clays of the Upper Lias, an attenuated and variable apology for the Marlstone Rock-bed, and a considerable thickness of the Middle Lias clays underneath. The Middle Lias is much covered with superficial drift to the west of Hallaton.

4.—Another recognised division of the Middle Lias clays in the Oakham district are the beds of blue, highly micaceous clay, with large septaria. These are developed in brickyards at Ouston, Pickwell and Whissendine (see map, Fig. 1).

Brickyard Section, near Ouston.

a. Soil.
b. Light coloured clay, partially exposed.
c. Ironstone band, 6in.
d. Blue clay, containing much mica, and iron pyrites, 3ft. to 4ft.
e. Blue, sandy, micaceous and calcareous rock, 2ft.
f. Clay similar to *d*, but with bands of septaria, 21ft.; base not seen.

The bed *f* is the principal brick-earth in this neighbourhood. It contains rather more mica and pyrites than need be, though the bricks made therefrom are good ones. It is a grand exposure of the clays of the Middle Lias. About half-way between Pickwell and Whissendine (see map) the following section is recorded :—

Brickyard Section, near Whissendine.

a. Boulder clay, crowded with fragments of chalk and flint, with a few boulders of oolitic and other rocks, resting on—

b. Beds of dark-blue clay, with numerous layers of septaria.

The "solid" beds between Pickwell and Whissendine are much covered by enormous masses of Boulder clay, of a type similar to that mentioned as occuring in the Old Whissendine brickyard. This boulder clay is hardly suitable for brickmaking, it being crowded with fragments of stone. Still, the more venturesome manufacturer might think it worth his while to wash it, though we do not recommend the process in this case.*

Fig. 2:

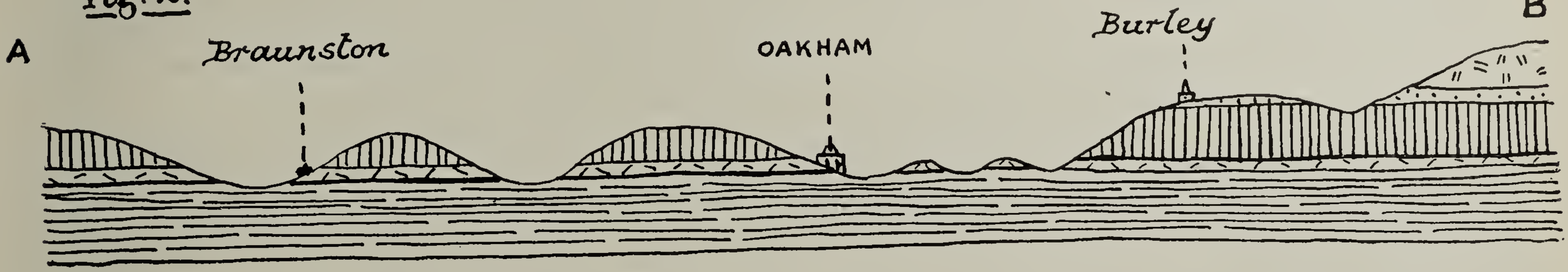
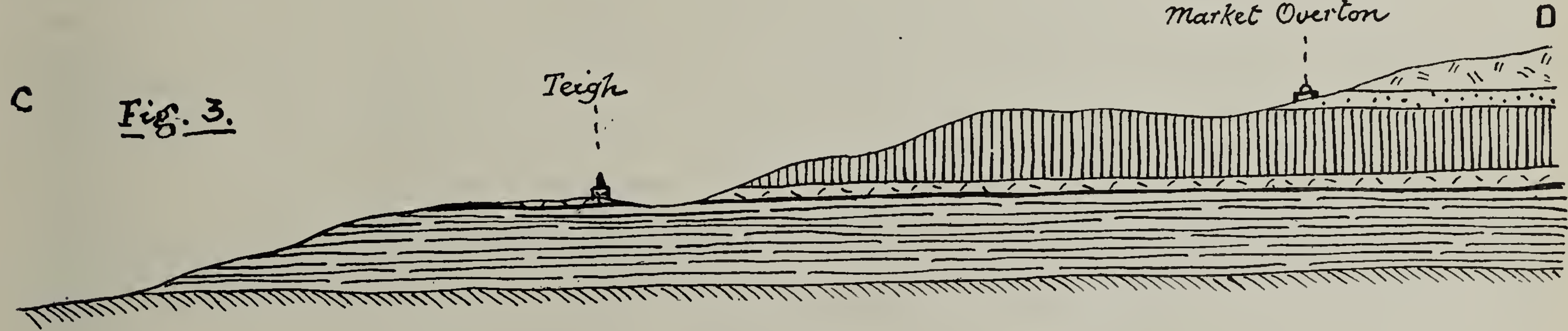


Fig. 3.



Figs. 2 & 3.—Sections along the Lines A B, C D in Fig. 1.
(N.B.—The symbols employed for denoting the various beds are the same as in Fig. 1.)

5.—The lowest member of the Middle Lias is a soft, yellowish brown, sandy and micaceous ironstone, crowded with shells, and alternating with light-blue clays. The clays pass into the Lower Lias, and may, for brickmaking purposes, be considered with them.

The Upper Lias Clays are well exposed in the Oakham district (see map). At the village of Braunston, and eastwards towards Brook, and westwards towards Knossington and the vicinity, the inlier cut down to the lower part of the Middle Lias yields some interesting sections, but the Upper Lias itself is largely covered with drift on the uplands in that neighbourhood. On the eastern side of the Marlstone outcrop there is a considerable expanse of Upper Lias rising to the foot of the escarpment of the Lincolnshire Oolite and Northampton Sand north and south, from Burley to Market Overton (see Fig. 1).

The relations of these beds are represented in the sections Figs. 2 and 3. In Fig. 2 we see the effect of the inlier at Braunston revealing the lower Middle Lias, also examples of the same phenomenon, bringing up the same beds near Oakham. It will be evident from the section that to get at the productive Middle Lias clays in the *massif* on which Oakham stands, we have but to penetrate a little way through the Marlstone. At Burley and along the valley to the north and south-east, the Upper Lias clays come on again, and, finally, the section shows the incoming of the Northampton Sand and Lincolnshire Oolite.

Fig. 3 is more restricted, but is drawn to show the relations between the different beds mentioned as occurring across the narrow outcrop from the neighbourhood of Whissendine through Teigh to Market Overton (rising country all the way), and exposures may be found at various points.

A description of those most useful beds, the Lower Lias Clays, is reserved for a future article. They are found in the Oakham district to the north west, and form flat, low-lying ground for many miles in that direction ; but from the circumstance that they are so thickly covered by drift, the clayworker there will not find them specially economical to work.

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* Speaking of washing brick-earths, we are reminded of a brickyard we visited the other day in Kent, where the earth employed contained at least 50 per cent. of stones, many of them large. These were being removed by washing, and are ultimately sold as road metal; the clay left behind for brickmaking purposes was exceedingly good.

The Northampton Sand escarpment to the east of Oakham is cut into in the vicinity of Exton, baring the upper part of the Upper Lias. At the same spot, interesting sections (now mostly covered up) occurred in tbe Lincolnshire Limestone. Particulars (Judd) taken at the time of the erection of the New Hall are as follows:—

Old Section at Exton.

	ft.	in.
a. Soil	2	0
b. Light blue, laminated sandy clay, with ferruginous stains in the bedding planes, and traces of plant remains	1	4
c. Fawn-coloured and ferruginous sands, finely laminated, with one or two argillaceous bands, each overlaid by a lamina of hard, brown hydrated peroxide of iron	2	6
d. Light coloured, finely stratified sandy clay, occasionally passing into sand and then becoming very ferruginous	3	0
e. Cellular ironstone rock ... ... seen	2	0

In the same district, the Lower Estuarine sands and clays were proved to be 9ft. in thickness.

Not far away, at Whitwell, the Lower Estuarine Series (just above the Northampton Sand) are revealed in a deep road cutting, and are seen to consist of white and fawn coloured sands, and light blue clays, under the Lincolnshire Oolite properly so-called.

Looking back on the whole district of Oakham, we see that the clays have been extensively worked for brickmaking from time to time. But there are many large areas within it which have, as yet, never seen the kiln, though suitable earths occur notably in the clays of the lower part of the Middle and Upper Lias. The causes for this, seem to be twofold. First, the circumstance that much of the best clay is covered over by a considerable thickness of drift; and secondly, the fact that good building stone is raised not far away, and is a severe competitor with bricks, except for purely local building purposes. The Marlstone, also, is a competitor in a way, for at Somerby and vicinity really good stone is obtained and largely used. Nevertheless, there is still considerable scope, for the really enterprising clayworker, in the Oakham district.

The Theory of Combustion.—At the last monthly meeting of the Leeds Association of Engineers a paper was read by Mr. F. Grover on "The Economics of Steam-Raising." Dealing with the theory of combustion, he showed in a practical way how the relative proportions of the constituents of furnace gases affect the question of economy, and gave a demonstration of the analysis of flue gases. Arndt's econometer was exhibited and explained; also Day's excess air-meter for determining the percentage of carbon dioxide in the gases. The causes of the various efficiencies realised by the use of forced draught, extended heating surfaces, and economisers were traced by means of tabulated results of boiler tests. Mr. Grover pointed out that the actual loss of fuel passing away in the form of smoke was inconsiderable, and held that, unless a boiler plant was very carefully worked, the suppression of smoke constituted a direct tax upon the manufacturer.

THE OUTLOOK.

An inspired writer in the *Daily Mail* has been informing the readers of that enterprising print that the slump in the brick trade, so long expected, has at length arrived; and he bases his information upon the fact that the Kent and Essex Brickmasters' Association has reduced its price of bricks a few shillings. There is something really very ludicrous in learning that, because the last clamp in Sittingbourne has finished burning, the bottom has thereby been knocked clean out of the brick trade! And it is such papers as the *Daily Mail* which, professing to gauge the position of an important industry in this country, maintains the pleasing fiction that Kent and Essex are the only counties which supply the Metropolis with bricks—and those of one kind only.

What is more surprising is that the *Building News*, which ought to be better informed on the subject of brickmaking, takes up the cry on almost identical lines to those of the *Daily Mail.* "Prices are likely to drop to the vanishing point of profit," it says, owing to the action of the Kent and Essex Brickmasters' Association. And it finishes up exactly as does its contemporary, with the earnest exhortation to the public to "have nothing to do with any brick company, however flourishing its prospects may be on paper."

These journals might be interested in learning that bricks are still selling in Essex, by non-members of the Association, at 40s. per thousand, and that one firm has enough orders at this price to carry it through next year. But that is by the way. The "inspired" writer has, perhaps, served his purpose, whatever it may be, but we are in a position to state that the "slump" is not yet.

In all parts of the country there is evidence that next year, business will be fairly good, in spite of wars and rumours of wars. If there be a temporary lull in the trade just now, we warn our readers not to be led astray by any "cock-and-bull" story of business going to the dogs.

The man who sells his stock at unremunerative prices, and maybe most of his next year's make in advance, through fear of a wholesale slump, is likely to be undeceived before next summer. It would be absurd to shut one's eyes to the fact that in the brick trade, as in any other, there are years of famine as well as of fatness. We take them as they come, and make the best of it. At the same time, for a handful of manufacturers in one district to reduce their prices does not constitute a "slump" any more than one swallow constitutes a summer.

But the sting of the articles appearing in both papers lies in the tail. The public are, as we have said, enjoined not to take shares in *any* brick company about to be floated. How long since is it that the *Daily Mail* and the *Building News* acted as financial advisers concerning schemes of which they have not the slightest information, and in connection with a trade which, on their own showing, they know precious little about?

Surely it would have been more decent to have waited for some statement of fact before condemning every brick company about to appear as being of the "wild cat" order. And how long, pray, is this gratuitous advice to hold good?

Why, even the Kent and Essex brickmasters may be thinking of forming themselves into a limited liability company shortly. What then?

SOME ESSENTIALS OF SUCCESSFUL POTTERY WORKING.—III.

THE EVIL before mentioned, occurring as it does at the first and earliest stages, has a wide field for development; indeed, it is really never possible to gauge the actual extent of the mischief. Let it be supposed, for the purposes of illustration, that a mixture, consisting of a dense and highly plastic clay, as instanced, together with an open clay—large in grain, some sand and burnt material, is going through the combined mixer and pug mill. In all probability the coarse open clay will have taken up its due share of water, whereas the dense clay will have been scarcely affected at all, and, should the four constituents be respectively added in mass, or bulk, the chances are that, in the majority of cases, complete and intimate mixture would be quite out of the question. Under these circumstances no more favourable conditions—particularly if favoured by rapid drying—could be named for all that is bad and disastrous in pottery. Constant and unequal strains would exist at all stages of manufacture; resulting in reekiness, distortion, cracks and stunts. The reason is plain; two courses are open for the improperly soaked clay: it may or may not complete its soaking in the early stages of the manufactured wares—the effects would of course be intensified by improper and irregular mixing—in the first case, the swelling of the particles incidental to the absorption of water would strain and disturb the mass; and, in the second case, the improperly soaked particles, in not shrinking with the rest, would make themselves evident in cracks and stunts.

LET IT BE SUPPOSED, in the way of illustration, that a given clay, suitably ground and sifted, requires a period of thirty hours for complete soakage; and that a three-inch cube of the same requires slow and regular drying, for the matter of a week, before it is fit for the kiln. And further, say the total contraction, from the making to the burning, equals eighteen per cent., and the combined water equals eleven per cent. And lastly, that the clay is vitreous at twelve hundred degrees Centigrade, at which the maximum contraction is attained, from thence remaining stationary up to twelve hundred and fifty, followed by gradual expansion with an additional hundred degrees, with probable collapse at fifteen hundred. Now take a totally dissimilar clay, though existing side by side, in a mixture with a clay of the former type, a clay ground and sifted as above, that may require but five hours for complete soakage, one, moreover, which may be dried—taking our three-inch cube—with ease and safety in a day, and whose total contraction equals, say, twelve per cent., and combined water equalling seven per cent. The maximum contraction, in the kiln chamber, falling somewhere between fifteen or sixteen hundred degrees Centigrade, probably swelling only at about the melting-point of platinum.

IT IS OBVIOUS, from a careful consideration of the foregoing particulars, that, apart from the size of the particles and the relative proportions of two such constituents present in a mixture, awkward complications are possible at all stages, with consequent disappointment and loss, unless due precautions are taken. The loss will, of course, vary in its severity in accordance with the nature of the wares, and the disappointment, in the absence of specific qualities—working qualities—in the finished goods. However, the remedies, though not generally known, are not far to seek, provided the significance of the illustrations are fully grasped. It is plain that, in the soaking and preparation of the material, the time taken for the operation must be approximately that required for the complete subjection of the most troublesome constituent present in the mixture. The same remark applies with equal force to the drying of the manufactured wares. Much loss is occasioned by neglecting this rule, since, under forced drying, the more coarse and open clay of the mixture will dry before the fatter and more dense constituent. Bad and irregular mixing will, at this stage and in the ultimate burning, make matters worse. This must, as indeed it does, destroy in no small degree the cohesive powers of the constituents as integral parts of the mass. This induces a state of tension and strain which will find relief in a flaw, if the same is not developed in the way of a crack, during the drying, and before the wares are really handled at all. Much, of course, depends on the placing or sorting of wares in drying and in the kiln chamber. The more nearly they are dried, or burned, through and through and all parts alike, and through the same period of time, the better. Where the wares are so set, in either operation, that the laws of gravity in relation to the contraction of the wares are respected, the more nearly will the clayworker approach perfection in the conduct of his business.

SO WITH THE BURNING, in the early stages of the burning operation, during the expulsion of the combined water. It is always better to err on the slow side in attaining a dull, red heat—some five hundred degrees Centigrade—than to go up quickly with the preliminary firings. Mention has been made as to combined water, its quantity and time of expulsion, varying with dissimilar clays; the time taken for its expulsion being influenced by the state of division and thickness of the body. There is also another consideration; *i.e.*, the temperature at which the expulsion is complete. No definite temperature may be given, because none exists. The combined water may be given off at any temperature falling between one hundred and ten, up to four hundred degrees Centigrade. Two clays may exist, side by side, in a mixture; one yielding its combined water at one hundred and fifty degrees Centigrade, the other hardly clearing at three hundred and fifty. Seeing that this water can only be driven off as vapour, and knowing the vast difference in volume this physical change engenders, anything like rapid volatilisation occurring in the actual body of one's wares can only be attended by loss, particularly in the face of varying degrees of tenacity—as instanced above—peculiar to the respective constituents of the mass.

TO THE CLAYWORKER, no matter the section of the industry he may be engaged in, there is no more subtle and retarding influence at work than that connected with the behaviour of his clays under heat. Losses under this head are both general and severe, particularly in the higher branches of pottery. This is notably in general pottery, as applied to the arts and manufactures in electrical, chemical, sanitary and fireclay wares. If strains be eliminated, full seven-eighths of the cracked, split, and stunted wares, common to pottery, may be directly or indirectly traced to disturbances in the mass, due to changes in volume or bulk of some one constituent, induced by thermal and atmospheric changes in the kiln chamber. In many cases, particularly in connection with hard felspathic glazes and salt-glazed stone-ware, not to mention slipped and enamelled white cream and ivory sanitary wares, the temperature for burning is approximately that of twelve hundred degrees centigrade. This temperature maintained, for soaking purposes, for any length of time, in conjunction with a slightly reducing atmosphere, will together bring most clays perilously near the point at which these volume changes occur. The change in volume may be but infinitesimal ; yet sufficient, in itself, to cause a stunt. A further change, still unappreciable to the eye, may develop splitting, cracking, and even blowing or flaking. Further changes would become more evident, the swelling would be pronounced, with blisters and frothings at a later stage, which would immediately precede the slagging down of the mass. Matters rarely, if ever, reach this pass in practice, though many clayworkers of long standing and experience must have seen or experienced a kiln of wares run down ; when they doubtless have noticed that the wares were split, cracked and distorted, in the harder parts of the kiln ; such defects being more evident in the neighbourhood of the more heavily slagged wares, than in the more easy parts of the kiln chamber. However, such cases are comparatively rare ; the results are too obvious and plain to allow for continued loss in such examples of flagrant over-burning. The heaviest losses, in connection with pottery, invariably occur with greater persistency, because their origin is not so evident and plain to the senses. Who, for instance, would suspect such infinitesimal changes in volume—not visible to the sight—to be at the bottom of so much mischief and loss? Yet the fact remains ; much that is apparently unexplainable and shrouded in mystery in connection with pottery may be similarly explained.

FOR RELIEF IN THIS DIRECTION, particularly in the manufacture of expensive and important wares, the clayworker should have his materials tested, exactly as used, alone and in combination, at the hands of a really capable man. This should be renewed at any time when, from results, some slight departure from the original standard in the composition of some one material might be reasonably inferred. It is surprising the influence of varying quantities of lime and iron in clays, even quantities which the analyst might well pass, in the way of variation from the original standard, as being immaterial to the point at issue. In alloys of metals, for work of a specific character, the most minute variation, in quantity, of some one constituent will often spoil all ; destroying, in the case of a given alloy, all the more essential qualities of the mass. A pottery mixture has many points in common with an alloy ; any apparent differences will be found on examination to be by no means as sharply defined as a more cursory examination would imply. Then there are states of existence of combination : actual and probable, which no mere analysis, with the resulting percentage composition, can ever show.

IN CONDUCTING THE TRIALS, it is necessary, in the first place, to determine the particular temperature at which all contraction ceases, followed by the range in the temperature falling between that stage, up to and including the temperature at which expansion first occurs. It then only remains to determine the working limit of the rise, for safe and effective work. For most purposes, the great bulk of pottery, as used in the Arts, is never subjected to any higher temperature than is attained in the kiln chamber. Hence, in such cases, everything is directly under the clayworker's control. However, for metallurgic purposes generally—a by no means small and unimportant section of the clayworking industry—and for work of a similar character, the working temperature to which one's wares are habitually subjected may be, and often is, in large excess, both as regards intensity and time, to that employed in the preliminary burning of the wares. In the latter case such temperatures would become primary, and at once afford the standards for the volume changes of one's materials ; otherwise the wares would probably fail ignominiously when used in the manner described in connection with less refractory wares in the kiln chamber. That is if merely kiln temperatures were adopted as standards. These physical tests must, of course, be connected with the greatest accuracy to be of any real service to the clayworker. All temperatures should be taken and recorded, together with the necessary measurements : the latter being determined by means of a suitable steel sliding gauge, finely adjusted. The operations must not be hurried, they should be conducted under, as far as circumstances will allow, normal working conditions. The furnace should be fairly roomy and capable of working up to 3,000 degrees Centigrade, and under easy control. Such are the means, at the clayworker's command, for the solution of what is certainly the most troublesome question, all round, of his business.

IN THE MATTER OF KILNS, their construction, management, and burning, much may be said. First as to the type, updraught or down-draught, square, circular or oblong, single or multiple chambered. In the first place, the clayworker has for his objective the burning of the largest amount of good and sound wares, with the minimum expenditure of fuel, in the shortest possible time. To this end the clayworker must see that his kilns are well and properly filled, and that he gets every available quantity of heat out of his fuel in the burning of his wares. This last consideration is ever present with the clayworker ; it is seldom attained. Some indication of the unrest in this direction is given by the Patent Office returns in connection with new and improved kilns, particularly during the last ten years. Upon examination, many of the designs will be found as being theoretically perfect, but, unfortunately, one can never realise in practice all that theory demands. Hence the many failures. In any case a kiln must be strong in construction and simple in design. Taking the absolute working or holding capacity, a square or oblong kiln will hold relatively more wares than a round kiln. But the square or oblong kiln must needs be more strongly built. Instead of a series of thin, broad iron bands, with connections, as exists on a circular kiln, iron standards, bolts and tie rods, of considerable weight, thickness and strength are necessary for the stability of the kiln. The crown, in the case of the square or oblong kilns, must be much thicker and stronger than is usual with circular kilns. A down-draught kiln will always work more quickly, with a far lower consumption of fuel—and that of lower quality—than will an up-draught kiln of equal size and capacity, and filled with similar wares.

Aerial Ropeway in the Brickyard.—At the new fire-brick works of the Donnington Sanitary Pipe Company, Ltd., recently started at Church Gresley, an idea entirely new to the district has been introduced—an aerial ropeway for conveying the clay from the pits to the place where the process of manufacture is commenced. By means of this ropeway the clay is carried nearly a quarter of a mile overhead by means of an endless rope and trestles in specially-constructed buckets, each holding about 3 cwt. These are now carrying something like 7½ tons of clay an hour, and are really capable of carrying ten tons in that time. By this means the ordinary carting system, which would have to be by way of a much longer road, is replaced by what is justly claimed to be an economical and efficient means of transport. This interesting piece of mechanism has been constructed by the Ropeways Syndicate, Ltd. (Roe and Bedlington's system), under the personal supervision of Mr. J. F. Lindsey, one of the company's engineers.

MECHANICAL DRAUGHT IN BRICKYARDS.

It is difficult, nay almost impossible, to persuade the unscientific man that a chimney, whether small or large, costs anything to run, with the exception of the trifling repairs necessary after a lapse of time. One has fallen in a state of calm confidence in its natural gifts which amounts practically to a belief in perpetual motion !

A chimney naturally makes a draught, we think, without stopping to reason why.

Now it is a law of nature that all motion on our planet requires expenditure of force or work to produce it. Therefore it follows that the movement of smoke in a chimney requires force. This is clearly seen from the following simple statement of fact :—

Supposing a boiler consumes 500 lbs. of coal an hour and the chimney is 60ft. high. Now 1 lb. of coal requires roughly 23 lbs. of air for its combustion, therefore no less than 12,000 lbs. of gases pass away by the chimney in an hour. But the chimney is 60ft. high, and the gases are raised to the top of it. The work which must be expended to do this is 12,000 × 60 = 720,000 foot-pounds, equivalent to rather more than one-third of a horse-power per minute.

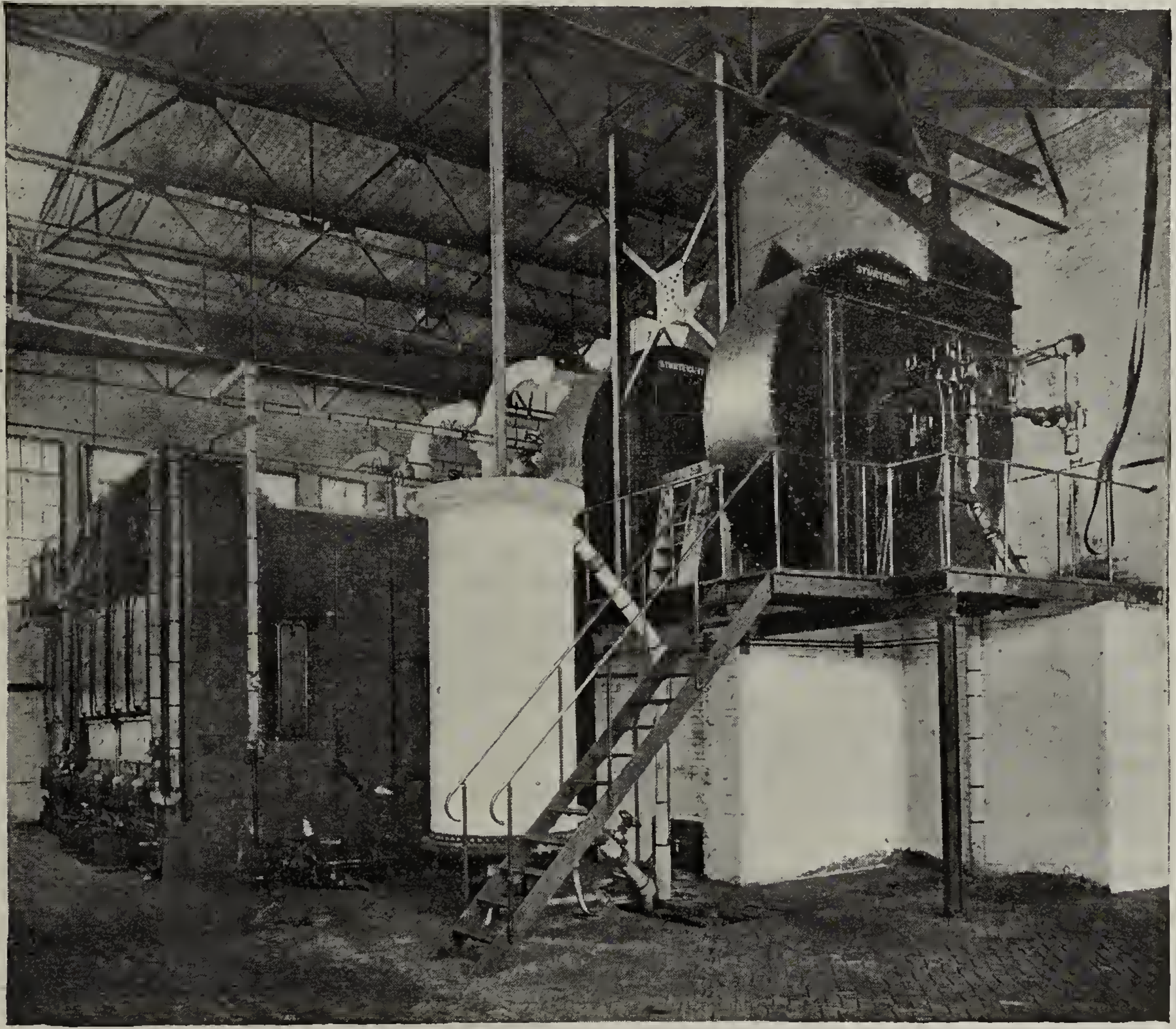
This calculation takes no account of the friction and resistance to be overcome in addition to the work of lifting the gases.

Oh ! one says, these gases are warm and therefore lighter than air and ascend of themselves. This is true, but it is a result of the fact that fuel has been burned to warm them, and this heat is partly used to raise the gases and partly thrown away at the top of the chimney. Fuel and heat produce work, and thus it is that work is consumed in creating the so-called natural draught of a chimney.

In large boiler installations, economisers are used, by means of which the waste chimney gases give up part of their heat to the feed water. This economy, however, is limited by the fact that chimney gases must be hot to produce draught, and the more they are cooled down the higher the chimney must be built in order to obtain the required draught. In this way recovery of waste heat from the products of combustion is is limited by the consideration of cost and efficiency of chimneys.

It is at this point the question of mechanical draught comes in. Artificial draught may be produced in various ways. In locomotives or portable boilers it is obtained by means of a jet of exhaust (or live) steam in the funnel. Mechanical draught proper is produced by means of bellows or blowing fans on one hand, and by induced draught fans on the other. The former method is well known in connection with forges and modern marine boilers, but up to the present time the induced draught method is but little used in this country, and has not received the favourable attention to which it is entitled.

The fan used for the purpose is very different from the ventilating fan, which is constructed to move large volumes of air at slow velocity and low pressure. The induced draught fan is enclosed in a steel case, has a central inlet on one side, and an outlet on the circumference. Whereas a chimney of greatest efficiency gives no more pressure than one inch, the



A Double Fan Induced Draught Plant.

induced draught fan may be run to give any pressure up to 8 or 10 inches on the water gauge.

To do this requires comparatively little power, and it is easy to see the immense advantages the induced draught gives over the usual chimney draught.

Firstly, there is the difference in first cost between the induced draught plant and a high chimney, which varies from one-half for small powers and as low as one-fourth for large powers.

Secondly, the fixed charges are less, such as interest on capital, repairs, etc.

Thirdly, the plant is saleable or movable.

Fourthly, it occupies less space.

Fifthly, it gives greater efficiency of combustion ; and

Sixthly, improved possibility of recovery of waste heat.

We can only deal now with the last two items.

In the matter of efficiency of combustion, it is a well-known fact that greater pressure gives better combustion, and it is also well established that better combustion gives increased efficiency, *i.e.*, less fuel is required to do the same work. Careful experiments show that in a boiler in which, with chimney draught, one lb. of coal will evaporate 7¼ lbs. of water into steam, with mechanically induced draught 1 lb. of coal will evaporate 9¼ lbs. of water. Further economy will result from the use of cheaper fuels which may be burned with the greater pressure of draught.

An insufficient boiler plant can be made sufficient with its use. This is indicated by the results of careful experiments, which shew that a boiler which will yield 1,550 lbs. of steam per hour with chimney draught will with induced draught yield 2,450 lbs. of steam. The fan will take only one per cent. of the steam to drive it, so that the net increase of evaporative and consequently horse-power in this instance is 876 lbs. per hour, or more than 50 per cent.

We now turn to the recovery of waste heat, and in this matter the brickmaker is more nearly concerned. In this connection we are no longer confined to the question of steam boilers. We are able to turn our attention also to brick kilns. We know of only one instance in England, and we believe it is at present the only instance in which the draught for a brick kiln is successfully produced by a fan.

Now it is evident that with mechanically produced draught, all the waste hot gases from boiler or kiln are delivered at ground level and available for any required purpose. One thinks at once, naturally, of brick drying, and here indeed is a reason for seriously considering mechanical draught.

We have heard of attempts to use the waste heat from kilns under drying floors, when a chimney was the agent for producing draught. They were failures, because the gases were cooled to such an extent that they were no longer capable of producing the necessary pressure of draught. When the gases leave a fan, however, they may be cooled to any possible extent and all serviceable heat recovered.

In a single kiln at least 90 per cent. of the heat produced by the coal is thrown away.

In a good continuous kiln from 35 to 45 per cent. of the heat goes up the chimney, though of course for a given output of bricks burnt this is not more than one-seventh of the waste in single kilns.

It will be hardly credited that the heat thrown away in a week in a continuous kiln burning 100,000 bricks per week is equal to that produced by about 5 tons of coal; with induced draught quite half of this heat is recoverable and would suffice to dry, roughly speaking, half the bricks burned by the kiln.

In a steam boiler from 9 to 30 per cent. of the heat produced by the coal goes away to waste. By means of induced draught 60 or 70 per cent. of this waste heat is available for recovery, giving an average economy of 10 per cent. of the fuel burned.

In all such cases the power required to drive the fan is only a percentage of the heat recovered, while at the same time the first cost and maintenance are only about one-half of those of a chimney to create the same draught.

Here then we see strong reasons for giving attention to the question. We may attribute the present neglect of it to two or three causes, the conservatism of the British manufacturer, the want of engineering knowledge and objection to calling in expert advice, and the objection to being troubled with apparently unnecessary machinery.

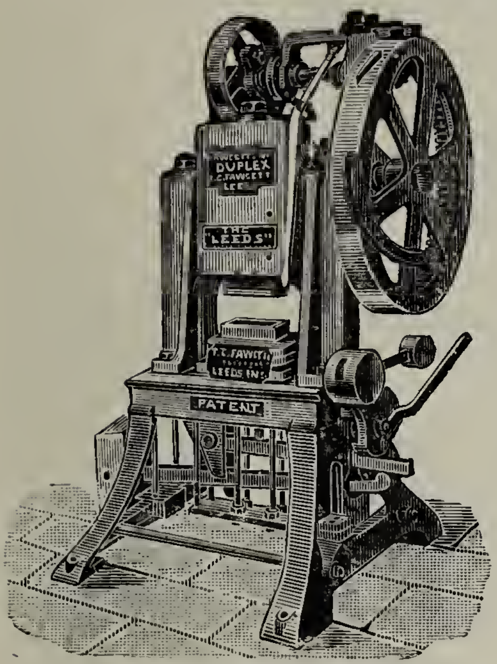
The rising generation is doing much to modify the first difficulty, the second is met by the possibility of getting sound practical advice from those whose business it is to supply the requisite appliances, and the third is enormously outweighed by the practical economy obtained by the adoption of the principle.

By the courtesy of the Sturtevant Engineering Co., we reproduce a photograph of their double-fan induced draught plant working the boilers of the Holyoke (Mass.) Street Railway Co. We may mention also, that the continuous kiln at present worked by induced draught is one constructed by Brown's Patent Kiln, Ltd., on the works of Mr. James Brown, at Chelmsford, Essex. In this instance a 3-b.h.p. oil engine driving a 60 inch steel-plate Sturtevant fan, produces the draught for a kiln burning 65,000 red and white bricks weekly.

The Workmen's Compensation Act—a piece of admitted Socialism.—No better subject could be found for a debate than that of the Workmen's Compensation Act, for no two persons who know anything about it seem to be in accord as to what it should be, or as to the interpretation of it as an Act of Parliament. It formed the subject of discussion at a recent dinner of the Article Club, with Mr. W. M. Crook in the chair, who dealt with the Act in an impartial manner as affecting the working classes, employers of labour and the legal profession. It was a social reform, cutting athwart party lines and to be judged upon the two guiding principles—the benefit of the working-classes and the well-being of the community as a whole. Mr. R. Bell, general secretary of the Amalgamated Society of Railway Servants, indicated the difficulty that arose in the interpretation of the words "in, on or about a railway," and their exclusion of workmen engaged in carrying for a railway company, or engaged in work elsewhere than on a company's premises. He also complained of the inconveniences arising from the locking-up of the amounts of compensation for the benefit of children until they reached the age of 14 years. He was in favour of compensation taking the form of a weekly allowance instead of a lump sum. Mr. C. Dilke, M.P., explained the difficulties in the way of extending the Act to cases of injury to health from employment in the lead process in pottery trades and other occupations, and could see no method of extending the operation of the Act to work under small employers unless the State insured the compensation, because compensation in many instances would mean bankruptcy of employers. The technicalities and legal difficulties of the Act could not be avoided, but litigation would be unnecessary if employers and workmen would adopt schemes adapted to various trades. This was the key to the right working of the Act. Mr. Justice Darling said there had never been put upon the Statute-book an Act more difficult to administer, for it was almost the first attempt to make a piece of admitted Socialism part of the law.

THE "LEEDS" BRICK PRESS

With Fawcett's Patent Stopping and Dead-weight Thicknessing Motion and Differential Pressure.



THIS Press is very largely used for pressing glazed bricks, which require to be all of exact equal thickness. It will press about 4,000 bricks per day with one boy to operate it, and will press them all of one exact equal thickness, although the quantity of clay may vary half-a-pound; this is done by the patent compensation arrangement of bottom moveable panel with levers and weights.

It is also suitable for pressing all kinds of plain and ornamental red and glazed bricks, tiles, and terra-cotta work.

It is also fitted with my patent differential purchase gearing, for giving double purchase while pressing the brick, which is a very necessary and advantageous feature over other Presses.

The Machine is substantially built, and of the best materials; all bearings are bushed with best gun metal, and of extra large sizes. The pressure is obtained by our well-known patent toggle-motion levers, which are all of the best crucible steel; all the working parts can be seen while the machine is at work, and are easy of access for oiling, etc. It is very easily and quickly adjusted for different thicknesses of bricks. It is also fitted with automatic gear for stopping the pressing head at the top after pressing the brick, and automatically lifting it out of the mould ready for taking away by hand instead of by the usual pushing arm; another brick is then put on, and by moving a small handle close to the operator, the machine starts and completes another cycle of operations.

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Whitehouse Engineering Works, Hunslet Road, LEEDS.

Makers of Patent Semi-Dry and Plastic Machines, Steam and Hand Presses, Pug Mills, Solid and Perforated Bottom, Clay Grinding Pans, Clay Crushing Rollers, Clay Mixers, Sieves, Engines, Shafting, and

GENERAL BRICK & CEMENT MAKING PLANT.

ILLUSTRATED CATALOGUES ON APPLICATION.

IRON DISULPHIDE IN BRICK-EARTHS.

IT is much to be regretted that officials connected with Geological Surveys are usually so slipshod in describing minerals in the field. Those who have been responsible for the mapping of the United Kingdom were excellent men and well fitted for their work, but, all the same, the stratigraphical geologist is commonly a poor hand at determining even the commonest minerals met with in the field. We are led to make this observation seeing that so many gross mistakes have been (and are being) made in nearly always describing crystallised iron disulphide as iron pyrites. Iron disulphide crystallises in two distinct forms, which have precious little in common except their chemical composition. To the brickmaker this matter is extremely important, as we shall see. Iron pyrites, one of these forms (also known as "pyrite" simply) weathers with considerable difficulty; indeed it may be regarded as a remarkably durable mineral. For instance, the little brass-yellow cubes and pyritohedrons found so frequently in slate rarely weather out of it, except by the decomposition of the slate in which they occur. Examples could be quoted where this iron pyrites in slate has lasted for centuries in roofs of old buildings. Not so, however, with the other form, marcassite, a mineral which is readily destroyed by atmospheric agencies. This begins to decompose by the development of a salt on and about its surface, and, in a very short time (especially in damp localities) it breaks up into a coarse white, yellow and black powder. In clays used for brickmaking, marcassite generally assumes the form of irregular nodules disseminated throughout the clay. On breaking one of them open, the section often shews radiating, acicular (needle-like) crystals starting from some fragment as a nucleus, the colour being light brass-yellow, and similar, in that respect, to the pyrite. It does not require much knowledge of the science of brickmaking to tell that the inclusion of iron disulphide in a brick-earth is very undesirable for brickmaking purposes. That is why the nodules are removed from the earth where they are very abundant. But, in those cases where the earth is dug and exposed to the action of the weather during winter, the "weathered" clay being subsequently freed from nodules in the preparation of the earth, it is essential to know whether the brass-yellow mineral is pyrite or marcassite. Because, the pyrite could remain for years and might not decompose, whilst the marcassite would in many instances decompose during the winter, thus rendering its removal impossible when the clay comes to be used. In other words the products of its decomposition spread over the clay, and considerably deteriorate the latter. It is essential, therefore, in describing brick-earths containing nodules of iron disulphide to state whether that is present as pyrite or marcassite, and that is what the government officials very rarely do.

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BOOK-KEEPING FOR BRICKMAKERS.—X.

APPENDIX.

BRICKMAKERS' ACCOUNTS.—FORMS.—*(Continued.)*

No. 11.—THE EASTVILLE BRICK CO.—PETTY CASH BOOK.

Date received.	C.B. fol.	Amount.	Paid.		Amount.	Postages, Printing, etc.	Travelling Expenses.	General Expenses.
		£ *s.* *d.*			£ *s* *d.*	£ *s.* *d.*	£ *s.* *d.*	£ *s.* *d.*
1896			1896					
Sept. 6	8	2 0 0	Sept. 4	Stamps	1 0 0	1 0 0	—	—
19	8	5 0 0	6	G. H. expenses, London and Yarmouth	3 0 0	—	3 0 0	—
30	8	6 0 0	20	Roller Bros., stationery	0 15 0	0 15 0	—	—
			26	F. L. expenses, Eastville	0 10 0	—	0 10 0	—
			28	Hospital contribution	0 10 0	—	—	0 10 0
			31	F. L. expenses, Fairholm	0 5 0	—	0 5 0	—
				Balance	7 0 0	—	—	—
		£13 0 0		£	13 0 0	1 15 0 P.L. 11	3 15 0 P.L. 12	0 10 0 P.L. 13
1896		7 0 0	1896					
Oct. 31	8	8 0 0	Oct. 1	Stamps	1 10 0	1 10 0	—	—
			5	String 1/-, Pens 1/-, Basket 2/-	0 4 0	—	—	0 4 0
			6	G. H. expenses, London 3 days	5 0 0	—	5 0 0	—
			20	F. L. expenses, Eastville	0 12 0	—	0 12 0	—
			26	Roller Bros., stationery	0 14 0	0 14 0	—	—
				Balance	7 0 0	—	—	—
		£15 0 0		£	15 0 0	2 4 0 P.L. 11	5 12 0 P.L. 12	0 4 0 P.L. 13
1896		7 0 0	1896					
Nov. 30	9	4 10 0	Nov. 3	Stamps	1 0 0	1 0 0	—	—
			8	G. H. expenses, London	1 10 0	—	1 10 0	—
			10	Sundry small expenses	0 2 0	—	—	0 2 0
			18	F. L. expenses, Eastville	0 10 0	—	0 10 0	—
			31	Roller & Co., for printing	0 18 0	0 18 0	—	—
				Enquiry Office Reports	0 10 0	—	—	0 10 0
				Balance	7 0 0	—	—	—
		£11 10 0		£	11 10 0	1 18 0 P.L. 11	2 0 0 P.L. 12	0 12 0 P.L. 13
1896		7 0 0	1896					
Dec. 31	10	6 10 0	Dec. 2	Stamps	2 0 0	2 0 0	—	—
			5	Telegrams, book 3/-, ink 2/-, blotting paper 3/-	0 8 0	0 8 0	—	—
			8	G. H. expenses, Colchester, Yarmouth, London and Eastville	2 10 0	—	2 10 0	—
			26	F. L. expenses, Eastville	0 11 0	—	0 11 0	—
			28	Subscription to Trade Protection Society	1 1 0	—	—	1 1 0
		£13 10 0			6 10 0	2 8 0	3 1 0	1 1 0
				Balance	7 0 0	—	—	—
		£13 10 0		£	13 10 0	2 8 0 P.L. 11	3 1 0 P.L. 12	1 1 0 P.L. 13
		£7 0 0						

No. 14.—THE EASTVILLE BRICK CO.—TRIAL BALANCE. Dec. 31st, 1896.

Sales Ledger Folio.		£	s.	d.	£	s.	d.	£	s.	d.
1	James Bros.	270	13	0						
2	City Gas Company	172	10	0						
3	Thompson, J. L., & Co.	150	0	0						
4	Read, J. R., & Sons	60	0	0						
5	Johnson Bros.	375	0	0						
6	Williams & Sons	200	15	0						
7	Day, J., & Co.	50	10	0						
8	Knox, J., & Sons	150	0	0						
9	Newman, J., & Co.	125	0	0						
10	Mason, R., & Co.	300	0	0						
					1,854	8	0			
Bill.										
1	Bill Receivable				199	0	0			
Purchases Ledger.										
3	Carrier, H.	32	0	0						
7	Bishop & Co.	4	0	0						
9	Binder Bros.	20	0	0						
11	Fowler & Co.	6	0	0						
17	Smokeless Coal Company	30	0	0						
19	Bridge Colliery Company	20	0	0						
21	Marks, J., & Co.	15	0	0						
23	North Junction Railway Company (Coal)	48	0	0						
25	,, ,, ,, (Bricks)	350	0	0						
29	Active & Co.	21	0	0						
Impersonal Ledger.										
5	Wages (Reserve)	40	0	0						
					—			586	0	0
2	Manufacturing Materials				23	15	0			
	Stock				10	0	0			
3	Repairs and Renewals				23	10	0			
	Stock				15	0	0			
4	Coal				400	0	0			
	Stock				50	0	0			
5	Wages				1,363	0	0			
6	Salaries				80	0	0			
7	Agents' Commission				69	0	0			
8	Carriage and Carting				1,457	0	0			
9	Bank Interest and Commission				3	0	0	6	0	0
10	Discounts				50	12	0			
11	Printing, Postages, &c.				8	5	0			
12	Travelling Expenses				14	8	0			
13	General Expenses				42	7	0			
14	Rates, Taxes and Insurance				50	0	0			
15	Sales				—			5,676	2	0
16	Stock				150	0	0	150	0	0
17	Bad Debts				109	0	0			
18	Book Debt Provision				—			109	0	0
Private Ledger.										
19	Machinery and Plant				3,347	0	0			
20	Freehold Land and Buildings				11,500	0	0			
21	Kiln A				3,000	0	0			
21	,, B				2,250	0	0			
22	Mortgage				—			4,500	0	0
23	,, Interest				76	2	6			
24	G. H. Capital Account				—			8,130	0	0
25	,, Drawings				50	0	0			
26	F. L. Capital Account				—			6,100	0	0
27	,, Drawings				30	0	0			
28	Interest on Capital				230	0	0			
Cash Book.										
10	Bank				—			1,223	5	6
10	Cash				18	0	0			
Petty Cash Book.										
2	Petty Cash				7	0	0			
					£26,480	7	6	£26,480	7	6

No. 14a.—THE EASTVILLE BRICK CO.

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PROFIT AND LOSS ACCOUNT.—For the Four Months Ending December 31st, 1896.

Bricks made 3,582,000. Bricks sold 3,382,000.

Journal.		Cost per thous. s.	d.	£ s. d.	£ s. d.
2	To Wages	7	7·32		1363 0 0
,,	Coal	2	2·80		400 0 0
,,	Manufacturing Materials	0	1·59		23 15 0
,,	Repairs and Renewals	0	1·57		23 10 0
	Cost at Works	10	1·28		1810 5 0
,,	Salaries	0	5·36		80 0 0
,,	Agents' Commission	0	4·62		69 0 0
,,	Travelling Expenses			14 8 0	
,,	Printing, Postage, &c.			50 12 0	
,,	Bank Commission			3 0 0	
		0	4·55		68 0 0
,,	Rates, Taxes & Insurance	0	3·35		50 0 0
,,	Discounts allowed	0	3·39		50 12 0
,,	Bad Debt provision	0	7·30		109 0 0
,,	Interest				
,,	Mortgage, *less* Bank Interest			70 2 6	
,,	Partners, G. H.			130 0 0	
,,	F. L.			100 0 0	
		1	8·10		300 2 6
		14	1·95		
,,	Balance profit divisible				
,,	G. H. $\frac{4}{7}$ths			1046 18 6	
,,	F. L. $\frac{3}{7}$ths			785 4 0	
		11	8·10		1832 2 6
		25	10·05		£4369 2 0

Journal.		Selling price aver. s.	d.	£ s. d.	£ s. d.
2	By Sales			5676 2 0	
,,	*Less:* Carriage & Cartin.			1457 0 0	
				4219 2 0	
,,	Stock 200,000			150 0 0	
		25	10·05		4369 2 0
		25	10·05		£4369 2 0

30

BALANCE SHEET.—December 31st, 1896.

Liabilities.		£ s. d.	£ s. d.
To Sundry Creditors	Trial Balance		586 0 0
Mortgage	P.L. 22		4500 0 0
Due to Bankers	C.B. 10		1223 5 6
Capital Accounts—			
Balance at Credit thereof—	P.L.		
G. H.	24	9126 18 6	
F. L.	26	6855 4 0	
			15982 2 6
			£22291 8 0

Assets.		£ s. d.	£ s. d.
By Freehold Land & Buildings—			
As on August 31st, 1896		9000 0 0	
12¼ Acres Land purchased since	20	2500 0 0	
			11500 0 0
Machinery & Plant—			
As on August 31st, 1896	19	3000 0 0	
Expended since		347 0 0	
			3347 0 0
Kilns—			
A.—As on August 31st, 1896		3000 0 0	
B.—As on August 31st, 1896, £2000 0s. 0d.	21		
Expended since £250 0s. 0d.		2250 0 0	
			5250 0 0
Sundry Debtors—	Trial Balance		
On open Account	Bill	1854 8 0	
,, Bills receivable	1	199 0 0	
		2053 8 0	
Less Provision for Bad and Doubtful Debts	I.L. 18	109 0 0	
			1944 8 0
Stock—			
Bricks	16	150 0 0	
Materials	2	10 0 0	
Coal	4	50 0 0	
Repairing Duplicates	3	15 0 0	
			225 0 0
Cash in hand	C.B. 10 P.C.B. 2		25 0 0
			£22291 8 0

(*Concluded.*)

TESTS OF CEMENT AND CLAY SEWER PIPES.

Mr. Max Garry, who was appointed by the International Association for the Testing of Materials to take charge of the investigation of methods of testing sewer pipes of cement and clay, has set forth the results of his investigations in his report published in "Les Matériaux de Construction." In 1895, he investigated, for the German Association of Manufacturers of Portland Cement, the methods employed by Governments, municipalities, and individuals for testing the strength of cement pipes. He found that in Germany, and also in other countries, these tests varied in each case, and none were regarded as adequate. Mr. Garry concluded that the tests to be made should determine the following points : The resistance to internal and external pressure ; impermeability ; resistance to the attack of acids ; and the wear and tear upon the interior by sand passing with the water. The tests, then, should determine mainly the bursting and crushing strength and the texture and composition of the paste used. The most important property in a cement or clay pipe is the resistance to external pressure, for nearly always such pipes are simply covered with earth or sand, and not enclosed in masonry. In passing judgment on the fitness of these pipes it is necessary to distinguish between the loads they are to sustain, for, as some are laid under travelled streets, under railway embankments, or under the foundation walls of buildings, the pressure upon them will differ. Mr. Garry describes the practice of several German cities in testing cement as follows :

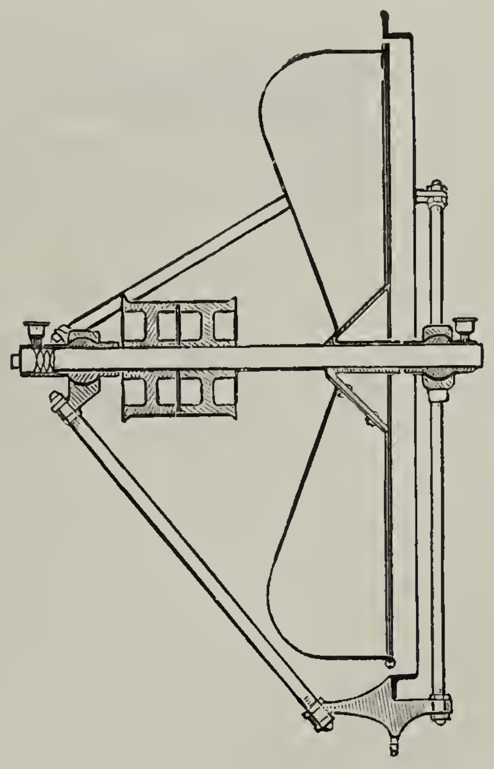
The Department of Public Works of Leibnitz requires that a cement pipe one m. (3.28 ft.) in diameter should resist the pressure of a layer of earth three m. (9.84 ft.) thick ; at Rasenheim, pipes covered with from 12 to 16in. of earth should resist the pressure of a heavy vehicle ; and at Colmar, when there is any doubt of the solidity of a pipe, a loaded wagon is passed over the laid pipe. At Mecklenburg-Schwerin, cement pipes must resist, without cracking, a pressure equal to 50 kg. per lin. m., and per cm. of diameter. This test is made by placing railroad rails on top of the uncovered pipe. The city of Freysing prescribes that the pipe should support a "load of 6,000 kg. concentrated upon the top of the pipe ;" and Passau demands that the pipe resist a pressure of 805 lb. per lin. ft. At Zeits, where the pipes are buried from 6 to 12ft. beneath the surface, a steam road roller is passed over them before acceptance. At Mannheim, clay pipes of 1 m. diam. have been tested by burying them in the earth under a layer 18in. thick. Over the pipe was then placed a double-plank platform measuring 3·28ft. square and 3in. thick, and on this was placed the test load. The rupturing load was found to weigh about 28,600 lb.

For pipes of "armed cement," or cement reinforced by a double iron mesh on the Zisseler system, the engineer of bridges at Bremen prescribes the following test : The pipe is buried in sand in a solid wooden box ; then by means of a cover fitting inside the box, a pressure of 7,500 kg. per running m., or about 500 lb. per lin. ft., is applied to the pipe. The pipe is required to stand this pressure without deformation or cracking. For pipes of oval section, 120 by 96 cm., and 6·5 cm. thick, armed with three layers metallic mesh, a uniform load of 9,000 kg. per m., or a little over 600 lb. per foot, is prescribed. At The Hague, Holland, the resistance of cement pipes is determined by placing them in a trench and then loading them uniformly on the square meter of horizontal projection. One pipe in every 50 is subjected to this test ; and this load is carried up to 12,000 kg. for pipes 1·5 by 1 m. and 1·2 by 0·8 m. At Copenhagen, Mr. Emanuel Jensen employs a process for testing pipes of clay and of "armed cement" which has given very satisfactory results. A heavy timber is imbedded in the soil, carrying upon one end a heavy counterweight of cement, and near this are two bars of iron, pierced with holes, attached to the sides of the timber. The pipe to be tested is placed in a strong box, nearly filled with sand, and resting upon the timber, and pressure is applied to it by a lever and saddle with a lever support on a pin passing through the holes in the iron bars. The advantage of this process is that the commencement of cracking in the pipe can be noted ; though this is of little advantage in the test of clay pipes, as after the appearance of the first crack the pipe will support but little more. But in the case of the Monier and Zisseler construction, where the iron skeleton augments the cohesion of the material, the appearance of the first fissure precedes by some time the final crushing load.

At the test laboratory at Malines, the resistance of pipes to external pressure is tested by a Kirkaldy machine, the pipe being placed between the two wooden saddles which each embrace one third of the circumference of the pipe. But as it is difficult to insure contact with all the inequalities of the pipe, the process is not satisfactory.

THE "SUN" FAN.

The "Sun" Fan Company, Limited, of Bradford, send us some particulars of their Fan for the purpose of ventilating and drying. It is claimed to be light and neat, with a frame of wrought-iron, making it unbreakable under ordinary conditions.



The Fan centre is made in the form of a pyramid, the flat sides of which form solid faces for securing the inside edges of the blades to, giving greater rigidity to them ; the special form of centre also gives direction to and a freer access for the air into the centre of the Fan, and the enlarged outer end prevents swirling and the return of air into the Fan on the discharge side ; by modifying the size of the centre and the form of blades, any reasonable amount of resistance can be overcome.

It is stated that the Fan is giving every satisfaction in such places where it has been fixed.

AN IMPROVEMENT FOR WIRE-CUT MACHINES.

ANYONE would have thought that so much attention has been concentrated upon the manufacture of wire-cut bricks that all possible improvements would have been completely exhausted by this time, but Mr. R. D. Workman, of No. 8, Upper Crescent, Belfast, thinks that he can go one better than anyone else has yet done in producing an improved spacing mechanism for use with brick-cutting machinery.

One of the chief points about Mr. Workman's invention is that the bricks or blocks of clay can either be spaced evenly or unevenly apart as may be desired on the receiving board, pallet or frame. Obviously, this invention can be adapted not only to the manufacture of wire-cut bricks but also of tiles.

The improvement is specially designed to suit that class of machinery by means of which is produced a band or column of clay of a breadth and height corresponding to the length and width of a brick or tile, and of course this column of material is by means of Mr. Workman's invention cut into sections of any required thickness by means of wires interposed in its course. There is nothing new about the use of wires, but we think Mr. Workman has certainly devised something novel as regards the means by which he spaces his bricks.

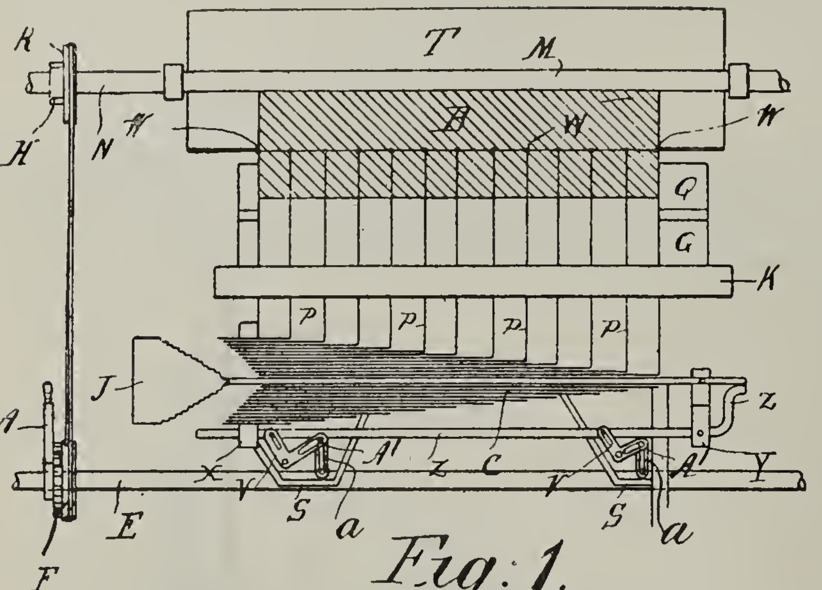


Fig: 1.

In the limited space at our disposal we can only describe the essentials of Mr. Workman's invention. By reference to the figure, which is very clear in itself, it will be seen that the back board of the table impels the cut-off sections through the wires on to a board pallet or frame, which can then be removed or caused to travel to the drying apparatus. In this machinery as at present constructed, the separate bricks or tiles are divided from one another by no greater space than the thickness of the cutting wire, which is insufficient in practice to allow them to dry properly, and to keep them from adhering together. To obviate this drawback, it is customary to space the cut bricks or tiles by hand, so as to leave a larger interstice between each separate brick, but this involves considerable expense for labour. The same effect is produced by mechanical means and a space between each brick is interposed as it lies upon the receiving board, entirely obviating the necessity of hand labour in moving and placing the same.

The apparatus may be constructed in various modifications within certain limits, in order to adapt it to the special mechanism with which it is designed to work, or to the special material of which the bricks, tiles, blocks or other forms are composed. By way of example, the form in which Mr. Workman prefers to apply it is to an ordinary brick-making machine. This he describes. Let us bear in mind that the arrangements for delivering the clay and pushing it against the cutting wires are of the usual well known kind. The special apparatus provided is operated by a connection (by means of a suitable gearing) with the gearing which operates the cutting-off table, and puts the apparatus in motion—the said gearing being controlled by a ratchet or other device. In front of the wires of the cutting-off table, are arranged a series of plates of suitable material, each aperture between the wires having its corresponding plate. These plates slip over the surface of the ordinary receiving boards or carriers for the bricks, and they pass through a slot or slots cut in a block or bar interposed between the mechanism and the bricks, which prevents the said bricks from travelling back when the plates are withdrawn. Each of these plates is connected to a rod or tube. These tubes are arranged one within another and each is shorter than the other by the width of a brick, in such manner that the innermost tube is the longest and is connected to the furthest plate, and so on, until the plate nearest the controlling mechanism is connected to the widest and shortest tube. These tubes are controlled in their position by a stepped cone applied to one end of the collection of tubes, whereby when the apparatus is operated, the plates are caused to move apart, the one from the other by the amount of each step or difference of the mandril or cone connecting the tubes.

An empty table-board pallet or frame having been placed on the cutting-off table, the lever which controls the mechanism is first pushed over into the extreme position in which the tubes are brought, so that the plates are in their closest position, and at the same time the plates are pushed forward until they occupy the space close up to the wires; consequently the freshly cut bricks are deposited upon them.

The reversal of the mechanism actuating the table causes, by means of the gearing connected with the cone, the tubes to move one over the other, and consequently the plates connected with them to separate until the required interval between each plate, and consequently between each brick is obtained. The continued motion of the lever causes it to strike against a projection which withdraws the plates from beneath the bricks; these are prevented following the plates in their backward motion by the stopping bar already mentioned. The bricks are consequently deposited at the required interval apart upon the carrying board or the like, and can then be removed in any desired manner. A fresh board is brought in place, the lever is reversed and the plates brought into their original position close to the wires and the operation repeated.

If our readers refer to the drawing given herewith they will see a very clear plan view of the apparatus at work, and the letters given in the figure are really unnecessary to a clear understanding of the method which Mr. Workman uses.

The Mayor of Warrington, Mr. Alderman Roberts, was born in Warrington in 1853. He acted for many years as secretary of the Liberal Association, and ultimately became agent to the party. He commenced business in Warrington in 1885 as a brick and tile manufacturer, and is now the managing director of the Warrington Slate Company, Limited. Mr. Roberts has been a member of the Town Council for nearly 15 years. He is chairman of the Rivers Committee, and in this connection, on August 11th, 1896, he received the special thanks of the Council for his valuable services in connection with the long and protracted negotiations with the Manchester Ship Canal Co. He is the President of the Warrington Chamber of Commerce, a trustee of the Warrington Savings Bank, and the representative of the Corporation on the University College of Liverpool.

THE BREWERS' EXHIBITION.

The promoters of the Exhibition of 1899, which closed on Saturday, November the 4th, are to be congratulated on the attainment of its majority. The exhibition has been crowded daily, in spite of bad weather, which prevailed throughout the whole period of the show. The Brewers' Exhibition has, for years past, been noted for its crowd ; it seems to have no inconsiderable hold on a large section of the general public — metropolitan for the most part —and the Exhibition of 1899 has proved no exception to the rule.

A crowded exhibition in the way of sightseers may be eminently satisfactory to the refreshment contractor and the cheap-jack, but it does not follow that it is so to the *bonâ fide* exhibitor.

An exhibition, purely technical in character, held in connection with any given industry, generally commands an altogether different following—not necessarily large, though infinitely more important to exhibitors —than one of the " variety " order; wherein the name is subservient to the show.

The changed character of the visitors, as compared with previous years, was a matter of general comment on the part of exhibitors ; there being a notable falling off in the way of large orders, and in the general tone of the exhibition. And the reason is not far to seek. Quacks, conjurors and cheap-jacks, with their schemes for " covering the red " and their electric fish ponds, etc., practically ruled the roost. One could not walk round the gallery in particular, without being accosted by foreign-looking gentlemen, or ladies in fantastic garb ; vendors of inconsiderable trifles, who did not scruple to obtrusively thrust their wares under the notice of visitors in passing. One fellow, a cheap-jack, who professed to give away money with his wares, was particularly loud and objectionable—it only wanted the flaming naphtha-light to complete the scene. In this motley company were many old-established firms of standing and reputation which, in so far as the potting industry was concerned, were ably represented by Messrs. Doulton, of Lambeth; Messrs. Geo. Skey, of Tamworth ; Messrs. Stiff and Sons, of Lambeth ; Messrs. Bourne, of Denby ; and Messrs. Price, of Bristol. It would appear that the complaints of exhibitors were not altogether without foundation. The promoters would do well in setting their house in order ; they should change either their name or their exhibitors.

As regards pottery as used in connection with the brewing industry generally, no particular novelties were noticeable. The clayworking exhibits were of the highest class in their respective spheres ; taking the quality in connection with the price. Messrs. Doulton & Co. had a large and excellent variety of their well-known wares, both plain and ornamental—decorated. Messrs. George Skey & Co. are to be complimented on their progress, and on the general improvement visible in their wares. For good, plain, glazed pottery, tastefully arranged on large and roomy stands, not overcrowded withal, their exhibit was hard to beat. Messsrs. Stiff & Sons were showing in their old quarters, as were Messrs. Bourne and Messrs. Price, the latter with a far better arranged exhibit than heretofore. The standard of excellence attained with regard to under-glaze printing, both as regards variety in design and sharpness in definition, is about as high as one could well wish it to be. There would appear to be a general levelling up all round in this direction.

Glass was, as usual, well to the fore ; but there were not wanting indications of its decline. It has beaten pottery in the manufacture of mineral water bottles and "Ales," and this for two primary reasons. In the first place pottery will stunt, with consequent all-round annoyance and loss. Secondly, glass is cleaner. People like to see, in most cases, what they are drinking, and, in the case of minerals, where bottles are filled over and over again, the state of the inside of the bottle is, in the case of glass, readily seen, Then again, the bottles are cleaned and filled piece work ; with glass there can be no " shorts," neither can the work be scamped. It is in the larger wares, as containers, that pottery excels. After looking at the large, gaudy, ill-shapen and designed glass vessels on view, and comparing the same with the decorated pottery of, say, Doulton & Co., the possibilities of potting in this direction looked encouraging.

THE WORKMEN'S COMPENSATION ACT, 1897.

CAUGHT BY THE MACHINE.

On November 3rd, Thomas Madden, employed in Dunipace Brick Works, Denny, had his left side seriously lacerated by being caught by one of the machines, and had a narrow escape of being killed.

FELL BETWEEN THE ROLLERS.

On November 6th, at the Rabuon Brick and Terra-cotta Company, Limited, Ruabon, a youth named William Evans, of Rhosymedre, was engaged with the machinery, and by some means fell between the heavy rollers. His body was terribly mutilated, and both legs were cut off. He was removed in a dying state to Ruabon Hospital.

DEATH THROUGH LIFTING A STONE.

On October 31st, at Mexborough, Mr. D. Wightman held an inquest touching the death of John Rowley (41), a clay-getter at Messrs. Hallatt's brick works at Wath, who died in the institution. The deceased had complained to his wife that he had hurt himself lifting a heavy piece of stone, and Dr. F. S. Burnam found that the diseased had died from strangulated hernia.—A verdict in accordance with the medical evidence was returned.

WHAT IS AN ACCIDENT?

Sheriff-Substitute Maconochie, in Edinburgh Sheriff Court, has issued an interlocutor in an action under the Workmen's Compensation Act, at the instance of Angus Niven, residing at Grange Pans, Boness, against West Lothian Pottery Company (Limited), for 18s. a week while incapacitated for work. The Sheriff finds that the pursuer has not set forth in the petition averments relative to show that he has suffered, within the meaning of Section 1 of the Workmen's Compensation Act, personal injury by an accident arising out of and in the course of his employment, when working in the defenders' factory. He therefore dismisses the petition and finds the pursuer liable in expenses. In a note the Sheriff says the pursuer averred that his employment required him to stand constantly over a tub of various poisonous liquid chemicals which gave off poisonous fumes, which he "accidentally" inhaled, with the result that he sustained personal injury by lead poisoning. He adds that no exhaust fans or other appliances were used for drawing off the poisonous fumes. The Act gives no definition of the word "accident," and he does not find that the question has ever come before one of the higher Courts for decision. In his opinion, it is not broad enough as used in the Act to cover sickness, which is the recognised effect of a known cause, acting during a lengthened period of time. In an accident there must, he thinks, be present a certain element of the unforeseen and sudden. A relevant case might be made out if it were averred that he was poisoned by a sudden outbreak of poisonous fumes due to want of care on the part of his employers or of some unforeseen occurrence. But that was not the case pursuer made. Agent for Pursuer—Mr. D. Howard Smith, solicitor. Agents for Defenders—Messrs. Anderson and Chisholm, solicitors.

THE LAW.

Heavy Fine for neglect of Factory Act.—At Brierley Hill Police Court, Oct. 26, before Mr. N. C. A. Neville (Stipendiary), John Edgar Perry, manager of brickworks, Shut End, was summoned for not keeping a register of young persons in his employ, as required by the Factory Act ; with not having certain machinery fenced ; and with employing Lot Villiers, under the age of sixteen years, without a certificate of fitness. Mr. Ashworth (factory inspector) prosecuted, and Mr. Parkhouse (Birmingham) defended. Mr. Ashworth said on the 10th inst. he found at work six or eight persons under eighteen years of age who had not been registered, and also the one named above who had not a certificate of fitness. He told Mr. Perry he had information that there was a large fly-wheel in the works which was quite unfenced, and said he wished to see the fly-wheel of his engine. Mr. Perry took him to the engine-house, and he found the fly-wheel there fenced, but he noticed through a partly-open door a big fly-wheel, and remarked that this must be the one about which complaint was made. From what took place afterwards he believed this second fly-wheel was intentionally kept from his view. It was unfenced. Mr. Perry said when he showed the inspector the fly-wheel of the top engine, it never occurred to him to show the big fly-wheel, and he had no intention to keep it from Mr. Ashworth's knowledge. Mr. Parkhouse said defendant was ignorant of the requirements he was under. The Stipendiary said it was absurd to plead ignorance and forgetfulness. If he was so ignorant, defendant should not be in trade. It was a case of wilful disobedience of the Act. For not fencing the machinery he should fine him £10 and costs, and in the other two cases £1 each and costs—total £13 17s.

The Smoke Question Again.—At Walsall County Court, before his Honour Judge Young, an interesting action was heard on the question of the effect of fumes from brickworks upon vegetation. Thomas Hough, of Goscote Lodge Farm, near Walsall, claimed £27 8s. from Messrs. John Hough & Son, Heath End Brickworks, Goscote, being in respect of damages alleged to have been sustained by reason of defendants' permitting smoke and noxious fumes to escape from their brickworks, whereby the same became a harm and a nuisance to the plaintiff, and injurious to his land and crops adjoining defendants' brickworks. Plaintiff also claimed an injunction restraining defendants from carrying on their business so as to be a nuisance to the plaintiff. Mr. Graham (instructed by Mr. W. Joel Cooke), appeared for the plaintiff, and Mr. R. C. E. Plumptre (instructed by Mr. Enoch Evans) was for the defence. Mr. Graham explained that plaintiff was a farmer, and entered into occupation of his farm at Goscote thirteen years ago. At that time the land occupied by defendants was ordinary agricultural land, and between the two properties was a lane. Previous to the defendants taking up their position, plaintiff's crops were of normal quality, and two trees and a fence were in a flourishing condition, About 1890 or 1891 the brickworks were built, and had been, it was understood, from time to time increased in proportion according to trade demands. As early as 1892 plaintiff had occasion to complain about the fumes issuing from the kilns damaging crops, and a solicitor's letter was sent to the defendants, but no further proceedings were taken. Year by year the nuisance had got worse and plaintiff had at last determined to come to the Court for redress. His land extended over about eleven acres. Speaking in regard to the injunction, counsel said a man had no right to get up anything which would be a nuisance to a neighbour, and if injury was sustained in consequence of its continuance, and a nuisance was likely to recur, the plaintiff was entitled to an injunction. After several witnesses had been called there was a consultation between the parties, and it was announced that the action had been settled, but the terms were not stated.

Clayworkers' Stoppages.—At the Rochester County Court the case of Frank Miskin *v.* six clay getters was heard. The plaintiff, a clay merchant, of Stoke, sued the defendants for 2s. each as overdraft of wages. It transpired that 2s. 6d. had been deducted from the men's wages when they joined the gang, and that the present claim was in respect of money overdrawn when some of them did not belong to the gang. His honour did not see that the men ought to be made liable under the circumstances, whereupon the case was withdrawn. Each of the six defendants was allowed 5s. costs.

Neither a Quarry nor Mine.—At Eckington Petty Sessions, James Wilkinson, Norton, of the Woodside Brick Company, Meersbrook Bank, and Joseph Enoch, Woodseats, were summoned for a breach of the Quarries Act of 1894, at Norton, on September 19th. Mr. Middleton (Chesterfield) prosecuted, and Mr. A. Neal (Sheffield) defended, and urged that his client was simply removing rubbish, etc., for levelling purposes, and that there was neither a quarry nor a mine. The bench did not think it a serious case, and fined the first-named defendant 10s., and the latter £2 and the costs.

The *locus standi* of Councils.—A discussion arose, at the Abergele Urban Council, on the report of the surveyor (Mr. R. E. Hughes), to the effect that a chimney and sheds had been built on a new brickyard within the district, no plans having previously been submitted to or approved by the council. The work is being carried out by Mr. Evans, the site being at the railway side, in the direction of Rhyl from Pensarn. The surveyor said Mr. Evans questioned the right of the council to demand a plan, but the clerk (Mr. E. A. Crabbe) declared that Mr. Evans had no right to put a brick there without the consent of the council. Mr. Perkins remarked that the brickworks would be a great detriment to Pensarn. There were valuable sites of building land there, which were to be opened out, but nobody would take them with a brickworks in the near vicinity. Dr. Wolstenholme pointed out that the works would be an important industry for the locality, as the scarcity of building materials interfered with the growth of the district. Ultimately it was agreed to demand a plan of the chimney and erections, and to forbid any further progress with their construction until approved by the council.

Failure of a Brick Manufacturer.—*In re* Sanderson. On October 24 in the Bankruptcy Court, an application for discharge was made on behalf of James Lyon Playfair Sanderson, being described as a brick manufacturer, of the Ashtead Brick Works, at Ashtead, Surrey, formerly carrying on business as a tea merchant at St. George's House, Eastcheap, E.C. Mr. A. H. Wildy, Official Receiver, reported that the proofs of debt and the probable claims not yet proved amounted together to £22,511, and that the assets would realize about £184. He alleged the statutory offences (1) that the debtor had contributed to his bankruptcy by rash and hazardous speculations, (2) that he had continued to trade after knowing himself to be insolvent, (3) that he had omitted to keep proper books of account, and (4) that his assets were not of a value equal to 10s. in the pound on the amount of the unsecured liabilities. The speculations referred to were in connection with the Ashtead Brick Works, and were rash having regard to the bankrupt's lack of capital and small experience of the brickmaking trade when he engaged in it. The bankrupt explained that the works would have been a success but for the action of the fourth mortgagee of them, who pressed him for interest before he had a chance of earning it. Mr. Registrar Brougham was clearly of opinion that the venture was a rash and hazardous speculation and had contributed to the bankruptcy. It also appeared that liabilities to a large amount had been contracted by the bankrupt after he knew he was insolvent. The allegation as to the books of account was a small matter and related to the books of the brickmaking business only. On the four grounds reported by the Official Receiver the discharge would be suspended for three years from May 2 last, when the public examination was held.

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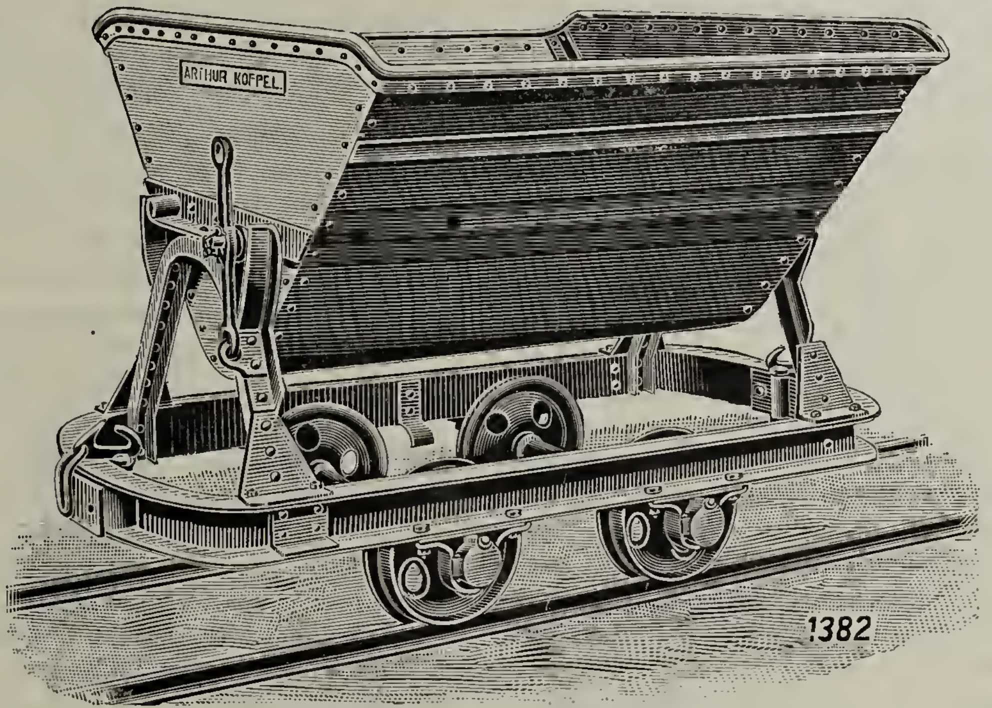

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COMPANIES' MEETINGS.

Dolphin's Barn Brick Company, Limited.—The directors of the above company have submitted their second annual report and statement of accounts for the year ended 30th September, 1899. The profit earned during the year, after providing for Debenture and other interest, and all other charges, amounted to the sum of £2,521 3s. 2d., out of which the following have been written off — Depreciation on lands, buildings, plant, machinery, etc., £771 17s. 7d.; proportion of preliminary expenditure, £580 15s. 5d., leaving available £1,168 10s. 2d. The directors recommend that a dividend of 5 per cent. be paid to the shareholders for the past year, which will absorb £533 7s. 0d., and that the balance, £635 3s. 2d., subject to the payment of directors' fees, be carried forward to the next account. Mr. Henry J. Allen has been co-opted a member of the board. The directors retiring by rotation are Messrs. Alex. Ward and J. Budd Doyle, and, being eligible, offer themselves for re-election.

Harrogate Red Brick Company.—The first annual report of the company to September 30th, 1899, stated that three of the works were taken over as from the 1st September, 1898, and the fourth works not until 1st December, 1898. The profits, therefore, include thirteen months' working for three works, and ten months for the fourth works. After charging £660 6s. 5d. for interest on debentures to September 30th, and £471 12s. 8d. for depreciation of leasehold and movable plant, the net profit amounts to £4,927 4s. 2d. From this must be deducted interest payable to vendors, managing director's remuneration, and the 6 per cent. dividends on preference shares, April 1st and October 1st, 1899, leaving the sum of £2,506 8s. This the director's propose to deal with as follows :—To pay a dividend on the ordinary shares to September 30th, 1899, at the rate of 6 per cent , which will absorb (payable December 1st) £1,200 ; to carry to reserve fund £1,000; to carry forward to next year, £306 8s. Considerable expense has been entailed in placing the works in first-class condition, and the directors consider, in view of this, that the result is eminently satisfactory, and fully confirms the statement made in the original prospectus. The profits would have permitted a dividend of 10 per cent. or 11 per cent. on the ordinary shares ; but the directors are satisfied that the best interests of the company will be served by the creation of a good reserve fund, and therefore propose that £1,000 be placed to the credit of that fund.

The Aberdeen Lime Company.—The report by the sub-committee of management of this company states that the balance of profit for the year, after providing for all known bad and doubtful debts, is £7,987 8s. 1d. ; and the sum brought forward from last year is £548 18s. 11d., making a total of £8,536 7s. ; which the sub committee recommend to be allocated as follows, viz. :—(1) To carry to the credit of the following accounts to meet depreciation, viz.—Ground and buildings at Aberdeen, £1,250 ; machinery at Aberdeen and agencies, £500 ; buildings at agencies, £350 ; utensils at Aberdeen and agencies, £75 ; horses and carts, £25 ; shipping, £800—£3,000. (2) To carry to the credit of the shipping—boilers renewal account, £160. (3) To carry to the credit of reserve fund, £1,000. (4) To pay a dividend at the rate of 10 per cent. per annum, free of income tax, one-half payable on the first Friday of November, and the other half on the first Friday of May following, absorbing £3 750—£7,910 ; leaving to be carried forward to next year's accounts, £626 7s. The property and plant would then stand at £16,350 ; the shipping at £5,650 ; the underwriting account at £2,500 ; and the reserve fund at £12 000. The sub-committee are pleased to report satisfactory results in the year's working, which have enabled them, in addition to setting aside an ample sum for depreciation, to add £1,000 to reserve fund, and pay the same dividend as last year. They feel sure the accounts presented will be gratifying to the shareholders.

Foleshill Brick and Tile.—The directors of the Foleshill Brick and Tile Co., Ltd., have declared a dividend of 5 per cent. for the ten months ended 30th September.

Leamington and Lillington Brickyard Company.—At the annual meeting of this company recently the directors' report, which was adopted, showed a profit on the year of £1,467 10s. 11d., this sum and the balance of £263 1s. 5d. from the previous year, made a total of £1,730 12s. 4d. to be disposed of as follows :—The payment of a dividend of 8½ per cent. free of income tax for the past half-year, absorbing £680 ; £60 for directors' remuneration ; and a sum of £500 transferred to the reserve fund ; an interim dividend of 4 per cent. had already been paid, amounting to £320, total, £1,560, leaving £170 12s. 4d. to be carried forward to next year. The reserve fund now amounts to £2,500, Mr W. Travers was re-elected a director of the company, and Mr. J. F. Burgis auditor.

NEW COMPANIES.

Gypsine Brick Co., Ltd.—Capital £1,800, in £1 shares. To acquire and work patents and secret processes for the manufacture and production of bricks or blocks suitable for building purposes.

Oliver Goddard, Ltd.—Capital £5,000, in £1 shares. To adopt an agreement with O. J. Goddard, and to carry on the business of clay merchants, brick, tile and china manufacturers, etc. Registered office, 2, The Avenue, Newton Abbot, Devon.

W. H. C. Walker, Ltd.—Capital £5,000, in £1 shares. To carry on the business of a builder, brick, tile and terra-cotta manufacturer, carried on by W. H. C. Walker, at Brickkiln Street, and Heath Town, Wolverhampton.

Colwich Brick and Tile Co., Ltd.—Capital £7,000, in £1 shares. To acquire certain land at Colwich, in the County of Stafford, and to carry on the business of brick, tile, terra-cotta and earthenware manufacturers, etc. Registered without articles of association. Registered office, The Works, Colwich, near Stafford.

Cynon Colliery Co., Ltd.—Capital £5,000, in £10 shares, to acquire the business of colliery proprietors now carried on at Port Talbot, Glamorganshire, under the style or firm of "Rees and Co., Ltd.," and to carry on the business of colliery proprietors, and merchants of fireclay, bricks, etc. The number of directors is not to be less than two nor more than seven. The first are T. B. R. Richards, W. G. Morris and F. E. Jacob. Qualification, £250.

Kingsdyke Land Co., Ltd.—Capital £5,000. in £1 shares. To acquire and turn to account any lands supposed to contain brick earth or any substances useful for the manufacture of bricks and pottery, and to manufacture and deal in bricks, tiles, etc. The first directors to number not less than three nor more than five are C. G. Musgrave, O. Dan, C. A. Wilkes and A. Goddard. Qualification, 250 shares. Registered office, 23, Martin's Lane, E.C.

William Sharp and Company, Limited.—Capital £4,500, in £1 shares. To adopt two agreements with W. H. H. Winton and J. Keen respectively ; and to carry on the business of brick, pottery, tile and plaster manufacturers and merchants. The first directors (to number not less than two nor more than five) are : W. H. H. Winton and W. Sharp (permanent directors). Qualification of ordinary directors, 150 shares.

Fowey China Clay Co., Ltd.—Capital £25,000, in £1 shares, to acquire and take over as a going concern the business carried on by Antoine C. A. Lechenich and Gordon F. T. Beale, at Fowey, Cornwall, under the style of "A. Lechenich and Co.," and "The Fowey China Clay Co.," and to carry on the business of china clay and stone merchants. The number of directors is not to be less than two nor more than five ; the first are Antoine C. A. Lechenich, Gordon F. Beale and John E. Bingham (all permanent). Qualification, £500 ; remuneration as fixed by the company.

Midland Plastering Co., Ltd.—Capital £10,000 in £1 shares, to carry on the business of gypsum, lime and cement workers, manufacturers of bricks, tiles and pipes. The number of directors is not to be less than three nor more than seven. The first are to be appointed at the first general meeting. Qualification, £100; remuneration, £50 per annum, divisible.

General Land Investment Trust, Limited.—Capital £200,00 in £1 shares. To acquire any land, estates, &c., as brick and tile makers. The directors are R. C. and D. C. Craigie, and W. V. M. Popham. Qualification £200. Remuneration, £50 per annum each and a percentage of the profits, divisible.

TRADE NOTES.

Bricks are made about six miles up the Yukon, to sell at £16 to £25 a thousand, according to quality.

Much English Cement is being imported into America at the present time, it being obtained at a lower rate than has been possible for some time past.

Clayworking Reservists.—A number of army reserve men in Peterborough have joined their old regiments. Messrs. Hicks, Gardener and Co. have promised to allow the wives of reserve men in their employ 5s. a week and 1s. a week for each child whilst they are away doing duty for their country.

New Cement Works.—Work is proceeding at present for the construction of a large cement works on the land adjoining the Vale of Glamorgan Railway beyond Porthkerry village for a firm of Cardiff gentlemen. The kilns will in all probability be charged with limestone from the sea shore, and the industry promises to be of an extensive character.

The Belgian Kiln.—We are requested to state that among yards where this kiln has been recently adopted are those of the Salvation Army Colony, Essex; Smart's Brick Co., Ltd., Birmingham; Brill Brick Co., Ltd., Bucks; Fontley Brick Co., Herts.; Metropolitan Electric Supply Co.; Ashgrove Fireclay Co., Yorks.; and Messrs. Morton's, Limited, Halifax.

Irish Pottery Works.—There are not many pottery works in Ireland, and we have pleasure, therefore, in calling attention to the enterprise of Messrs. McCormick & Co., of Monkstown, who have recently erected the most modern plant in connection with the manufacture of field drain pipes, flower pots, and similar articles of horticultural pottery. They also manufacture cream jars and glazed pans and crocks.

Sale of a Humber-bank Brickyard.—A sale took place at the Yarborough Hotel of a property consisting of a brickyard on the Humber bank, at Barrow Haven, late in the occupation of Mr. George Ducker. Mr. J. Wass, of Scunthorp, was the auctioneer. The bidding commenced at £500, and advanced briskly to £825, at which price it was knocked down to Mr. Rushforth, of Grimsby. Messrs. Brown and Son were the solicitors for the vendors.

Brickmaking at Barton-on-Humber.—The unusually fine weather has prolonged operations here beyond the usual time. In ordinary seasons the manufacture of hand-made bricks is usually at an end by this time, but the open weather has induced manufacturers to continue work. No doubt this is largely due to the demand and the rise in prices. A walk along the Humber bank reveals the fact that stocks are low, and should the weather continue favourable for building purposes, they will be exhausted before next season. Most of the prepared clay has been used, and there will be ample employment for the workmen during the winter in digging and tempering clay ready for use in the coming spring.

Brickmaking at Exeter.—Exeter Brick and Tile Company, Ltd.—At the first ordinary general meeting of this company it was reported that an agreement with the London and South Western Railway Company to form a siding on the Exmouth line had been signed on behalf of the company; and also that the purchase of 16 acres of land on the Polsloe Priory estate had been completed. It was resolved that the work of laying down machinery and erecting kilns be commenced forthwith.

Presentation to a Brickmaker. — In connection with the forthcoming departure of Mr. Sankey, of Castle Gresley, an interesting gathering took place at the Crown Inn, High Cross Banks on Saturday evening, the 28th ult. The company, which numbered about thirty, partook of a capital supper. Mr. A. E. Hughes, of Messrs. Nadin, presiding, and was supported by Mr. C. Percival, H. Hardwick, J. H. Clamp, J. Bromley, G. Sankey (Church Gresley), J. Morris and W. Sankey. The vice-chair was occupied by Mr. Isaac Coates, who had as his supporters Messrs. G. M. H. Sankey, C. Allsobrook, E. Sankey, B. Bradshaw, J. Sankey, T. Blower and C. Tye. The supper was given by Mr. G. M. H. Sankey, who has been with Messrs. Nadin (Stanton Colliery, Newhall) two years as manager of their sanitary pipe works. He is shortly leaving the district for South Yorkshire to take up the position of manager to Mr. Taylor of the Dartfield Main Pottery, which has been standing some 18 months. When it became known that Mr. G. M. H. Sankey had secured this appointment, a number of admirers and friends formed themselves into a committee to get up a testimonial on the occasion of his departure. This took the form of a portmanteau, silver-mounted pipe and pouch. The officials and workmen of Messrs. Nadin's sanitary pipe works subscribed handsomely towards purchasing the articles. Mr. Hughes, on behalf of the subscribers, handed the gifts to Mr. Sankey, wishing him success in his new sphere, and Mr. Sankey appropriately responded.

Sanitary Building Construction.—At Carpenters' Hall, London Wall, Mr. Thomas Blashill delivered a lecture on "Sanitary Construction, Warming and Ventilation." He dealt specially with the properties and qualities of the materials used in the erection of dwelling houses, and with the modes of using them. The matter, he said, was one that affected the welfare of the whole population, for considerations of health required, in a very essential degree, that the buildings in which people lived should be so constructed as to provide ample warmth and ventilation, and also not be liable to penetration by heavy downfalls of rain. The walls of a house, whatever was the material employed, should be equally proof against damp and the quick passage of heat. The experience of ages had taught people how to erect walls properly, so that they generally found them able to comply with those conditions. In this country stone or brick was almost invariably employed for the purposes of construction. Here he might remark that stones that easily stood the pure air of the country were very often unable to withstand the atmosphere of our large towns, and the destructive effects of the acids with which it was impregnated. They had a striking illustration of that in the Houses of Parliament. Of all the stones granite was the most imperishable, because of the large percentage of pure quartz which it contained. It was notorious, however, that granite would not stand heat, and, therefore, it should never be used in cases where it was known that it would be so exposed. In the course of his lecture, Mr. Blashill pointed out the importance attached by medical sanitary science to the construction of the lowest floor of the house. It was requisite in the highest degree, in the interests of health, that the usual 6-in. bed of concrete should rest on a foundation of firm soil, and that the wooden flooring above the concrete should be fixed with great accuracy. By those means no reservoir for foul air would be left under the floor, and ventilating drains would not be wanted.

Brickmaking at Yeovil.—The Yeovil Brickfields, Ltd., have just got into working order. They have a very large quantity of clay which burns a rich red, and the bricks come from the kiln very true with hardly any shrinkage. They are burnt in a Belgian Kiln and dried in a shed heated with exhaust steam from the boilers. There is sufficient plant to turn out 12,000 per day, and the company hope very shortly to have sufficient orders in hand to double their plant and kilns.

Light Railways for Cornwall and Herts.—The Earl of Jersey and Col. Boughey, Light Railway Commissioners, have held an enquiry at Tavistock into an application by the Plymouth, Devonport and South-western Junction Railway Company, for an order authorising them to construct a light railway from Bere Alston to Calstock. Mr. Burchell, who appeared for the promoters, said the South-Western Junction Company already owned the East Cornwall mineral line, which extended from the quay at Calstock to Kelley Bray, near Callington, as well as the junction railway from Lydford to Plymouth, which passed through Bere Alston. Originally it was intended to construct an ordinary railway from Bere Alston to Callington, and convert the gauge of the mineral line; but the cost of the undertaking, especially of the viaduct across the Tamar, was too great. Taking advantage, however, of the Light Railway Act, the company now desired to make the connection by means of a light railway crossing the Tamar at Calstock. At the close of the enquiry Lord Jersey announced that the Commissioners would recommend the Board of Trade to issue an order sanctioning the construction of the railway. At Leighton Buzzard they considered the expediency of granting a local application for an order to construct a new line from that town to Hitchin, for the purpose of connecting the London and North Western and Great Northern systems. The length is twenty miles, and the estimated cost about £100,000. No serious opposition to the scheme was raised, and it was decided to recommend that the application be granted.

Main Drainage Proposals.—According to a report of the Drainage Committee of the London County Council, the time has arrived when a very heavy expenditure must be incurred by the Council in providing more sewer accommodation. Important recommendations for the construction of new works, based upon a report by the engineer, Sir A. Binnie, whose suggestions, if all are carried out, will envolve a capital expenditure of about £3,000,000. At present, however, the committee intend to ask the Council for sanction to proceed with only the most pressing works. In his report the engineer points out that at the time the main drainage system was established the actual population of London amounted to about 2,586,000 persons, and that Sir Joseph Bazalgette designed the system for a total population of 3,450,000, being an average of 46.9 persons per acre over the whole area within the metropolitan boundary. No provision was made for taking in the drainage from districts outside the metropolitan boundary, such as parts of Acton and Willesden, Tottenham and Wood Green, Hornsey, West Ham, East Ham, and Beckenham, the sewage of which is now, or about to be, partly or wholly admitted under Parliamentary authority. The population of the area now draining into the Council's sewers on the north side of the Thames, including certain districts outside the county, was, according to census of 1896, 2,941,114, and on the south side of the river 1,689,984, or roughly a total of nearly 4,700,000 people from both sides. A proportionate increase has probably taken place during the past 3½ years, and as the present system was only intended to serve a population of 3,450,000, it results that the number of persons for whom provision was made has already been exceeded by about 36 per cent. The Committee's present recommendations include the construction of two new outfall sewers, each 9ft. in diameter, from the Abbey Mills pumping station to the Barking outfall. The total length of each of these new sewers will be 4½ miles, and the engineer estimates the cost, together with that of extra works at Barking, at £600,000. With regard to the South of the Thames it is recommended that an additional outfall sewer, 11ft. 6in. in diameter, be constructed between the Deptford pumping station and the Crossness outfall works and a further considerable portion of the suggested new sewer from Crossness outfall to Catford. The total length of the first of these new sewers will be eight miles, and of a portion of the second now proposed to be built 2¼ miles. The cost of these sewers is estimated at £650,000, so that the total expenditure at present contemplated will amount to £1,250,000. It is anticipated that the construction of these works will occupy eight years. The capital outlay will by the year 1907-8 involve a rate of ·3,583d. in the pound.

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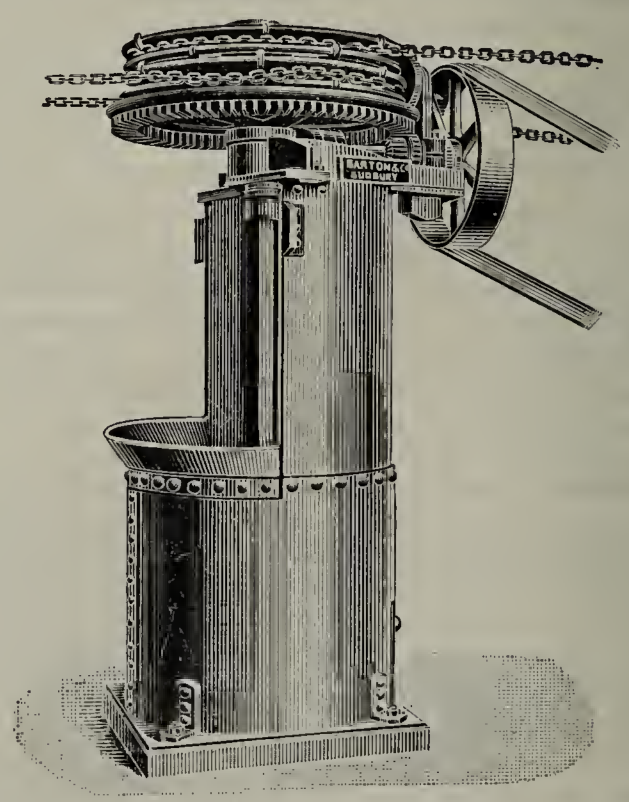

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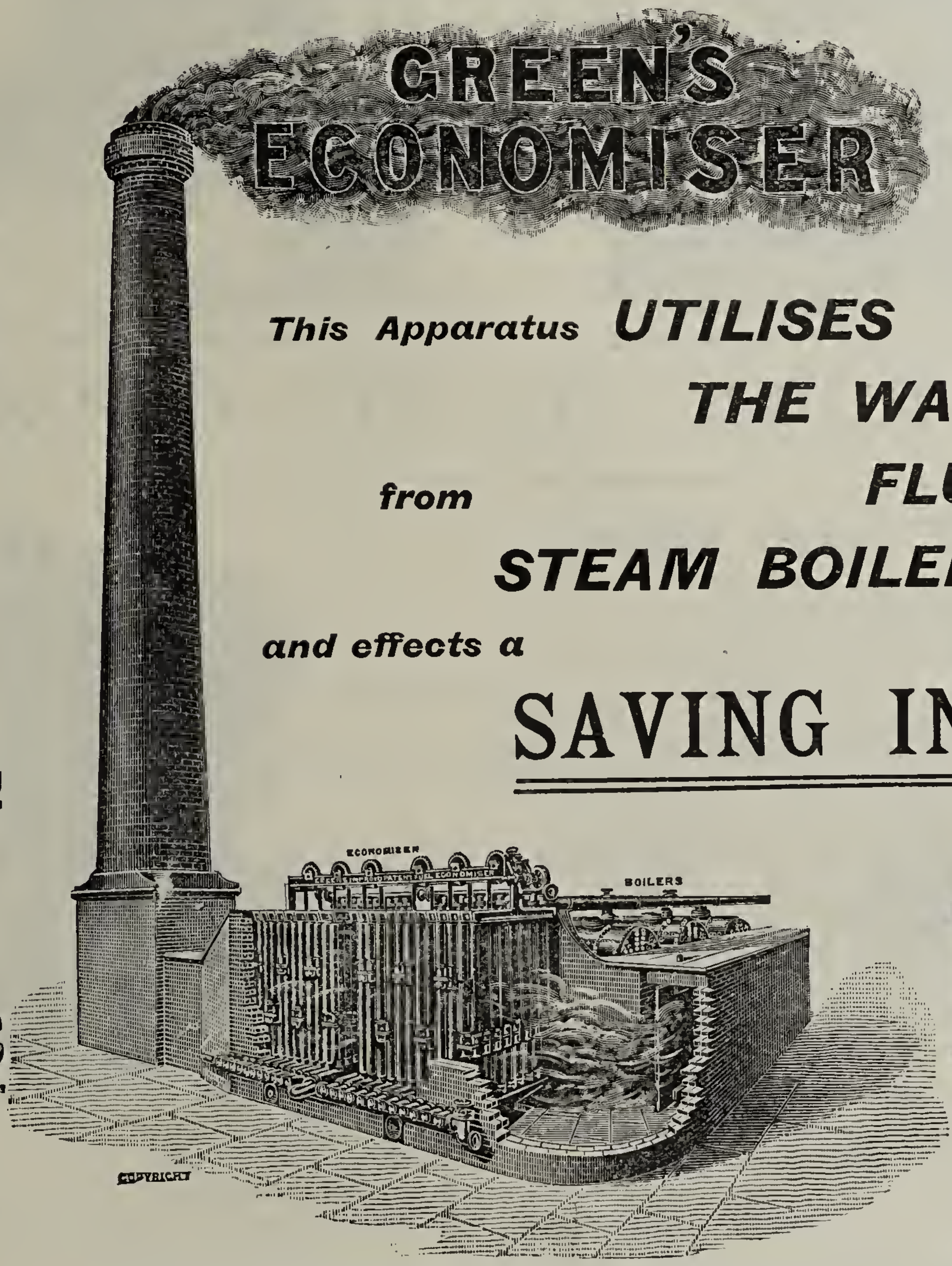

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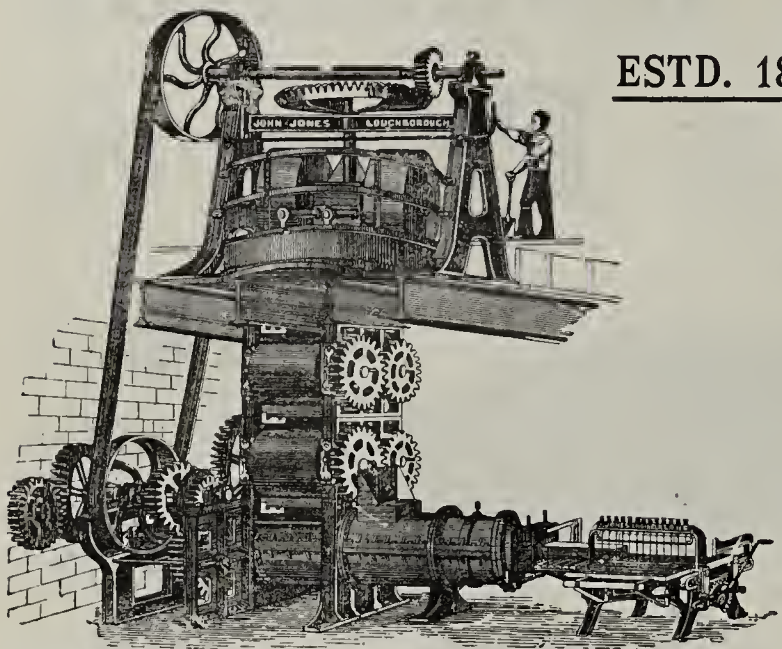

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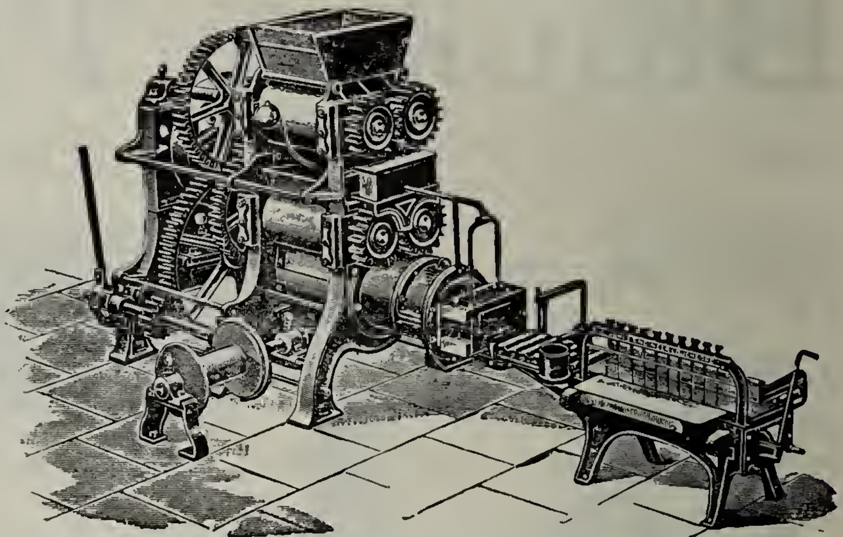

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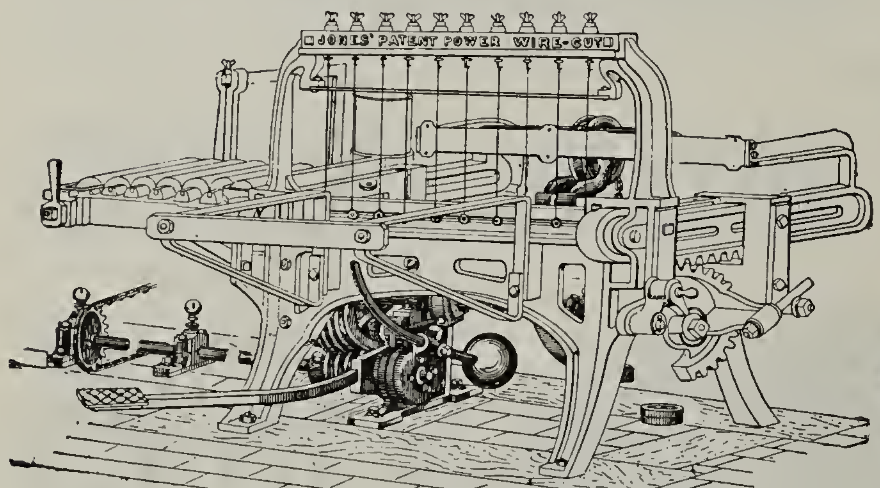

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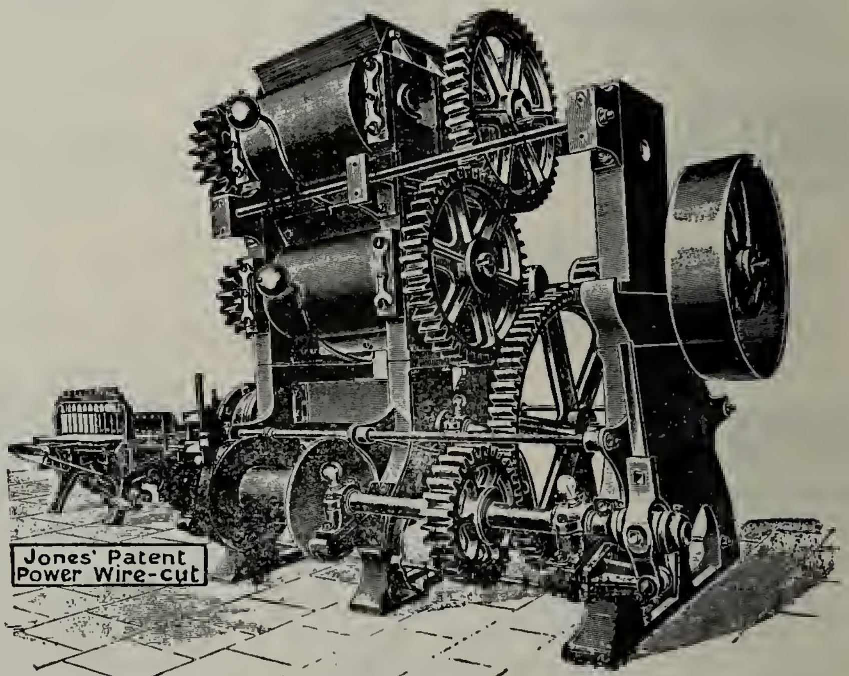

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New Improved Brickmaking Machine, for steam power, with Vertical Pugmill, of strong cast-iron sectional plates (can be made of steel plates if desired at a slight extra cost), complete, with expression rolls, lubricating brick die, cutting-off table, &c. This machine has double purchase spur and bevel gearing, and the expression rolls are driven direct from main shaft by spur gearing. It is mounted on strong cast-iron bed plate, and is fitted with my Improved Cast Steel Knives, and improved adjustable top thrust bracket.

One No. 0 Murray Machine, with expression rolls, as good as new, in stock at Northampton.

No. 7a Brickmaking Machine by Whitehead, with rolls overhead, and hoisting gear, cutting-off tables, &c., complete.

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Two Gill's Patent Presses, one with engine.

"Eclipse All" Brickmaking Machine by Scholefield, with press complete.

Scholefield's Semi-Dry Machine and Press, complete.

Portable Brickmaking Machine by Bedford Iron Co., horizontal pug, mouthpiece, die, and cutting-off table, complete.

Second-hand Bedford-type Machine, with expression rolls, cutting-off table, die, &c., complete ; used very little.

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Vertical Pug Mill, all iron, for steam power.

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No. 4 Hand Power Pipe and Tile Machine, Bedford Iron Co. type, complete with cutting-off table.

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Several Vertical Pug Mills for animal power.

Brickmaking Machine, consisting of vertical pugmill, die, and cutting-off table, for animal power.

Improved Hand Brick Press, with screw action from below.

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5 ft. 6 in. Under-driven Pan, rolls 2 ft. 6 in. diam., by Mason Bros.

7 ft. 0 in. Over-driven Pan, all complete, new. Weight 7 tons 10 cwt

9 ft. Perforated Pan, complete, and in excellent order ; over-driven.

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600 I.H.P. Compound Condensing Engine.

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Horizontal, Vertical, Portable, and Semi-Portable Engine, and Boilers always on hand. Customers are requested to kindly State Their Requirements in this direction, and they will receive offers of the most suitable Machinery I have to meet their wants.

Portable Engines in all Sizes ready for Work.

Complete Brickyard Plants Estimated for.

Discarded or Surplus Plants Purchased in any part of the United Kingdom.

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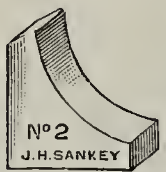

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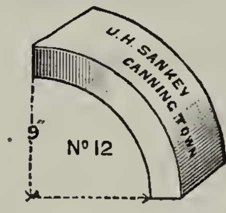

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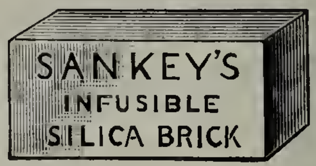

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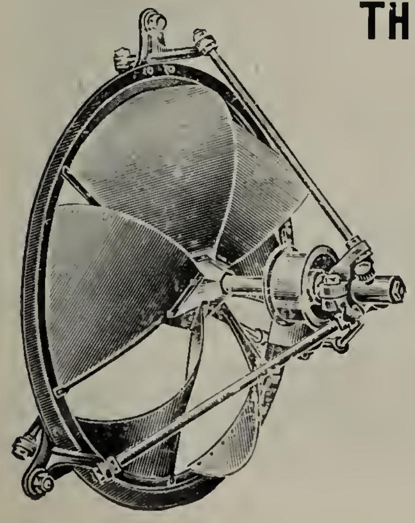

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WANTED, within easy reach of London, SMALL BRICKWORKS, with trade and brick earth, capable of development, or sound Partnership would be entertained.—Address, Nayler, Trade Agent, 150, Fleet Street, E.C.

FOR SALE in one or more lots, about 10 ACRES of GOOD RED BRICK EARTH, also a Pit of Red Brick Moulding Sand suitable for Rubbers. There is plenty of water on the estate which adjoins the Great Eastern Railway, and is only a short distance from water carriage. Brickmaking is now going on on this estate.—Apply "Sand," c/o this Journal.

CLAY.—To be LET, valuable BEDS of WHITISH CLAY for Brickmaking or other purposes, about 40 miles from London, close to Railway, and near Canal.—Address, Box 106, Office of *The British Clayworker*.

FOR SALE, about FIVE ACRES of FREEHOLD LAND, with Brick, Tile, and Pipe Works thereon, including Kiln, Moulding and Drying Sheds, &c. Abundant quantity of excellent Brick-earth and Sand, and a good supply of Water.—Apply Gardner & Son, Brick, Tile and Pipe Works, Coggeshall, Essex.

TO BE LET, with immediate possession, BRICKFIELD, near Faversham (Kent).—A first-class BRICKFIELD, with Wharves, Tram-roads, and Cottages. Good Earth can be obtained, by washing, from an easy distance.—For particulars, apply to Messrs. G. Webb & Co., Tunstall, Sittingbourne.

FAREHAM REDS.—A Bank of TWENTY ACRES of BRICK-EARTH, adjoining Swanage Railway Station, to which Siding can be obtained, to be LET or SOLD.—Apply to H. J. Sanders, 104, Bevois Valley, Southampton.

FOR SALE.—Compact FREEHOLD FIREBRICK WORKS in South Yorkshire. Estate comprises about 23 acres, with Manager's House, and 16 Workmen's Cottages; Fireclay seam 10ft. thick, also abundant Material for Building Bricks, for which there is a great demand; fitted up with powerful Machinery in good repair, with Engines of 28-H.P.; plentiful supply of water, from stream flowing through Estate. Is wrought to its fullest capacity, namely on Government Orders. Has been worked to a good profit by present owner for last 27 years, and is on Sale through failing health and advancing years. Plenty of scope for remunerative investment of additional capital. Only Principals or their Solicitors dealt with.—Address "Specialty," *The British Clay-worker*, 43, Essex Street, Strand, W.C.

IMPORTANT PRELIMINARY NOTICE.

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NOTICE OF SALE by Auction, by Mr. E. JACKSON, during the month of November, 1899, at the Station Hotel, Fleet, of the

Valuable Freehold Property

known as the GALLEY HILL BRICKWORKS, CROOKHAM, near FLEET (within a short distance of the Station), and BASINGSTOKE CANAL, comprising
22 ACRES,
The numerous Buildings, Manager's House, Stabling, Cottages, Drying Sheds, Kilns, together with the whole of the FIXED PLANT and MACHINERY, in capital working order, including a 40-H.P. ENGINE, BOILER, MURRAY'S MACHINE, ELEVATOR, PUMPS, PUG MILLS; a very large assortment of MISCELLANEOUS LOOSE PLANT, TOOLS, about 500ft. of SHAFTING, TROUGHS, BARROWS, HACK BOARDS, etc.; also the PREPARED CHALK, SAND, ASHES, and BREEZE, about 10,000 yards.

The Auctioneer begs to call the attention of Brickmakers, Contractors, and Builders to these important works. The Clay is of the finest quality and inexhaustible. There is an enormous demand for Bricks for many miles round. The roads are good in all directions.

Further particulars will appear in future advertisements.

The works may be viewed (Sundays excepted) by applying to George Randell, on the premises, and details can be obtained of Mr. E. Jackson, Special Auctioneer and Valuer, 11, Queen Victoria Street E.C.

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TEN ACRES of superior mild BRICK EARTH to be LET at 2s. 6d. royalty. 10 miles North of London. Capital for stocks, present price which is 40s.—MARK GILBERT, Auctioneer, Enfield Highway, N.

BRICK-EARTH and BUILDING LAND FOR SALE, near Station (G.E.R.) and River.—Roach, "Reeve Coombs," Rochford.

MINING PROPERTY.—For SALE Extensive FREEHOLD MIDLAND MINING ESTATE (nearly intact), with option of extensive adjoining Leasehold area, both ripe for immediate general development. Coals, Brick and other Clays proved. Exceptional opportunity for capital.—For particulars, &c., apply to HENRY JOHNSON, Mining Offices, Dudley.

TO BRICKMAKERS and CONTRACTORS.—TO BE LET or SOLD; FREEHOLD BRICK WORKS of about 23 ACRES with almost unlimited supply of Clay, in growing neighbourhood, nine miles from London, together with three Circular Kilns, Engine and Boiler House. Murray's Machine for Wire-Cut Bricks, and Brickmaking Plant complete; good references required.—Address A. W., 117, Chancery Lane, W.C.

FOR SALE, BRICKWORKS in HEREFORDSHIRE; about 8 ACRES; unlimited supply of Clay on surface, making splendid red-faced bricks. New Machine, capable of making 20,000 Wire-Cuts per day; Double Steam-Press, 15,000 per day; 3 Kilns; Drying Sheds; Railway Siding; splendid opening for Quarries and Tiles; two Cottages. To be sold as a going concern, through death. Fortune for energetic man.—Address "Croft," c/o this Journal.

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TO BRICKMAKERS AND CONTRACTORS.—The CREWE CORPORATION invite offers of Rent and Royalty for the right of making Bricks and getting Sand on 7¼ acres of land adjoining West Street, and within a few hundred yards of Merrils Bridge Railway Siding, and situate in a growing part of the Borough of Crewe. There is an average of about 18ft. of fine Rich Clay overlying a splendid bed of Building Sand, which it is proposed to work to a depth of 15ft.

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By order,

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To be Sold by Private Contract.

ALL that valuable Freehold WHITE BRICK & DRAIN PIPE WORKS, situate at Bardney, in the County of Lincoln.

The Property comprises about 9 Acres of Land (with one of the finest beds of clay in Lincolnshire), Plant, Machinery, &c., and has been worked successfully for thirty years by the present proprietor and vendor.

There is a convenient siding in connection with the Great Northern and the Louth and Lincoln Railways.

Ample room for extension or for the introduction of any other business.

The new free bridge over the river Witham at Bardney has opened out an extensive area of land under cultivation

If desired a commodious Freehold Residence adjoining the premises will be included in the Sale.

Part of the purchase-money may remain on the property at a low rate of interest. Splendid opportunity either for a syndicate or otherwise.—Apply to GEO. HALL, Proprietor.

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WANTED.—KOPPEL'S or A.B.C. Double-Decked BRICK-DRYING CARS.—Price and particulars to "Dryer," 43, Essex Street, Strand, London.

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WANTED, Cars and Rails for Tunnel Brick Dryer.—State condition, capacity, height, etc., to W. H., *British Clayworker*, 43, Essex Street, Strand, London.

ADVERTISER Building New Works (in Yorkshire) WANTS STIFF PLASTIC MACHINE, GRINDING, MIXING, PRESSING MACHINERY, and DRYING FLOOR PLATES; good Second-hand preferred. Silence polite negative.—Address "Plant," c/o this Journal.

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FOR SALE. — "LITTLE WONDER" BRICK MACHINE, complete with Cutting-off Table; capable of turning out 30,000 bricks a day of 10 hours; practically New, only used a few times; reason for selling, not suitable for cutting bricks containing cinders; cost £240, will take £150, prompt cash; free on rail near London, with sundries included.—Apply Box 4, Post Office, Rochester.

FOR SALE, First-class Modern Type HORIZONTAL ENGINE, 18in. Cylinder, 30in. stroke, highly finished, with Fly Wheel and Govenors; also 20in. by 36in. Stroke Horizontal Engine, with Lancashire Boiler, insured at 70lb. working pressure. Nearly-new Lancashire Boiler, 30ft. by 7ft., insured at 100lbs. working pressure.—For price and particulars, apply ERNEST WILKES, Pelsall, near Walsall.

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ONE CORNISH BOILER, 16ft. by 5ft.; FOUR GALLLOWAY TUBES; STEAM DOME.—Apply MEIN, 28, The Green, Stratford, Essex.

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FOR SALE.—A BREETHING PATENT SAND-FACED POWER BRICK MACHINE, Horizontal PUG-MILL, and Driving Gear complete; can be seen working.—Apply RICHARD D. BATCHELOR, Artois Works, Chatham.

FOR SALE, BRADLEY & CRAVEN Semi-Plastic BRICK-MAKING AND PRESSING MACHINE complete, with 7ft. 6in. perforated pan; capable of turning out 15,000 bricks per day; in first-rate condition. Also High-Pressure Horizontal ENGINE, 12in. cylinder, 24in. stroke, complete with high-speed governors, on strong cast-iron box bed-plate; also heavy fly-wheel, 8ft. by 8½in. face; also main driving pulley, 6ft. diameter, 13in. face. In splendid condition.—Apply Casebourne & Company, Limited, Cement Works, West Hartlepool.

FOR SALE, 26 × 36 Pair Massive High-Pressure STEAM ENGINES, heavy fly-wheel.
18¾ × 20 Inverted high-speed Engine, 10ft. fly-wheel.
14½ × 30 Horizontal Engine, turned fly-wheel.
12 × 24 Vertical Engine, very strong, self-contained.
4½in. Ram Cameron Pump, 7in. cylinder, 6in. stroke, by Butter-wor
8in. Rams, *pair* Cameron Pumps, 12in. cylinders, 10in. stroke, by Pearn.
9in. ditto ditto, 12in. cylinders, 10in. stroke, by Jos. Evans & Sons.
BOILERS, Lancashire—20 × 6, 25 × 7, 28 × 7.
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,, Galloway—18 × 6, double rivetted.

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MACHINERY, &c.—*Continued.*

HORIZONTAL BRICK MACHINE up to 18,000 per day, one pair rolls, by CLAYTON HOWLETT & Co., FOR SALE and a bargain.—ARMSTRONG, Northampton.

FOR SALE or HIRE, several large PORTABLE ENGINES, six to twenty-horse; Wash Mill, Pug Mills, Chain Windlass, Crushing Mill, Brick Machine, Chain Pump, Centrifugal, Deep-Well Pumps. —Address WILLSHER, Forest Hill, S.E.

RUSTON, PROCTOR & Co., Limited, Lincoln, Manufacturers of CORLISS ENGINES, UNDERTYPE ENGINES, PORTABLE ENGINES, and LANCASHIRE BOILERS.

IN STOCK HERE.

78 HORIZONTAL ENGINES.
42 VERTICAL ditto.
20 PORTABLES, LOCOMOTIVES, and TRACTION ENGINES.
25 BOILERS, Lancashire, and Cornish, &c.
40 PUMPS, up to 30in. cylinders.
10 MORTAR and CLAY MILLS.
IMMENSE STOCK OF TOOLS AND GENERAL PLANT.

New Catalogue on request.

THOMAS MITCHELL & SONS, LTD., BOLTON.

HACK CAPS! HACK CAPS! HACK CAPS! A SPECIALITY. *The Largest Maker in the Kingdom.*

Also Maker of **Crowding, Off-Bearing, and Navvy Barrows, Strikes, Pallet Boards, Hack Boards, Sleepers and other Brickyard Requisites.**

Estimates given on receipt of specification.

Appended are three recent testimonials:—

UPPER BROOK, TITCHFIELD, HANTS.
I am glad to tell you that your Caps and Lewe Boards have given me every satisfaction. H. ANDHEWE.

THE RUNNYMEDE BRICK AND TILE WORKS,
EGHAM, SURREY, *July 7th, 1898.*
Dear Sir,—The Hack Caps, etc., you sent us early in the Spring have and are giving every satisfaction, we are pleased to say.
Yours truly, HELLYER BROS.

ILFORD, E., *15th July, 1898.*
Dear Sir,—The caps, etc., supplied by you are satisfactory.
Yours truly, WM. ASHMOLE.

For Sample Hack Cap forward 1/- in stamps

Write for Prices and Particulars to H. BLACKNELL, Postal Box and Hack Cap Manufacturer, FLEET, HANTS.
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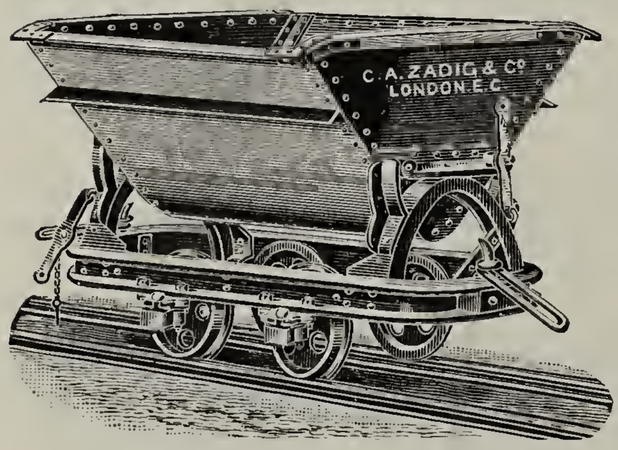

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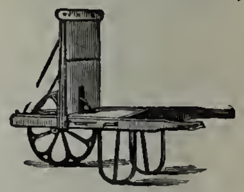

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THE BRITISH CLAYWORKER.

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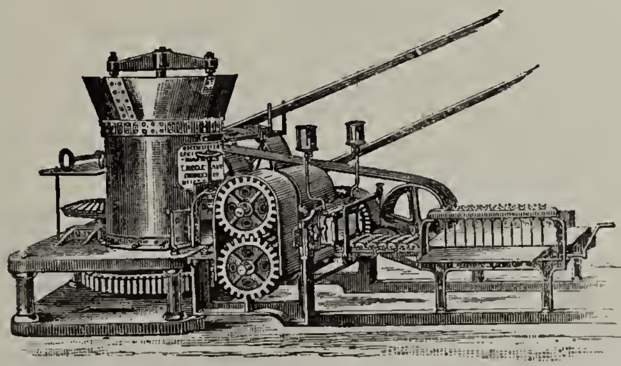

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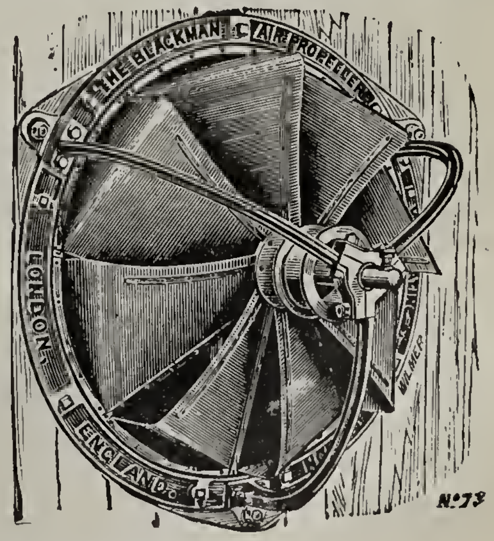
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BY THE WAY.

Our friend Herr March, of Charlottenburg, whom we met on the occasion of our journey to Berlin, has written in his own language a most interesting, if elementary, account on the Staffordshire Potteries. He has not been contented with noticing the various clay-goods turned out from Tunstall, Burslem, Hanley, Stoke, Fenton and Longton, but he has given some particulars of their manufacture, and the nature of the materials employed therein. In fact, from the English standpoint, his remarks savour more of the "Annual Consular Report" rather than a commonplace account of one of the most interesting industries of England. It is, however, a little livelier in tone than the class of official documents alluded to, and therein consists its principal interest to the clayworker.

* * *

Herr March also touches upon the local administration of the Staffordshire potteries in so far as their working is regulated by Act of Parliament. Thus, the functions of the Factory Inspector, the County Council, Town Council, and the Inspector of Nuisances are briefly described, and although this German brickmaker does not expressly say so, it may be inferred that he is under the impression that the factories are a little bit over-legislated. We quite agree with him, and we go further, and say that it is time that a little more centralisation took place. It is unquestionably an interference (and a very serious one at present) with the liberty of the subject to find that so many petty annoyances have to be borne. Busybodies, who know nothing about pottery works, and whose chief qualification is that they have been elected to do the work by those who themselves have been elevated by the public, surely ought not to have anything to do with even the minor details of the regulation of large pottery businesses. The author is not contented with merely describing the Potteries, however. He was evidently impressed with the Lambeth establishments, and the work done by the late Sir Henry Doulton. Finally, the London smoke and fog nuisance is dealt with, and the doings of the Smoke Abatement Society. The scope of the Public Health Act, and other cognate subjects are also noticed. We will not accuse our friend of wandering away from his subject, but it is very good of him to notice the function of the *British Clayworker* in regard to several of these points.

* * *

Those Clayworkers at home who are looking for fresh worlds to conquer, might well turn their attention for the moment to Hungary, in which there would appear to be a field for enterprise. The Minister of Commerce for Hungary has introduced a Bill designed to encourage the establishment of manufacturing industries. The encouragement is to be given in the form of indirect bounty. Two classes of industries are to be thus favoured—those already existing which it is desired to increase, and those not hitherto known in Hungary. Amongst the former are manufactories of porcelain, terra-cotta, fire-bricks, etc. All producers of these commodities are for a limited number of years to be exempt from payment of taxes on their property, and from the payment of stamp duty on receipts. In addition to these privileges, the founders of new manufacturing establishments are to be freed from the usual taxes charged for the creation of fresh businesses, and are to have all their building materials and machiney carried on the Hungarian Railways at specially low rates. These favours are to cease after a period of fifteen years. Here is a chance for would-be fortune finders.

Cases tried in the Courts touching the smoke nuisance arising from brickmaking are so often pre-judged in favour of the appellant asking for injunction, that it is refreshing to find from a case recently tried, that the plaintiff did not have things entirely his own way. Further, we find that the judge himself took the trouble to look into the matter of dispute, and on rehearing the case, he stated that he was glad he had viewed the scene of contention himself, because he discovered that the position had been greatly exaggerated by the plaintiff's witnesses.

* * *

We commend this action to Mr. Justice Kekewich, and other less learned legal gentlemen who are too apt to jump to conclusions, and in more than one sense, are led by the nose, inasmuch as, having smelt the odours arising from a suburban brickyard, they imagine that brickmaking is one and the same thing all over the country. In fact, some judges are unaware in these end-of-the-century days, of the existence of smoke-consuming kilns.

* * *

In the case to which we have referred, it is interesting to note the value of smoke-injured property. A hedge, to which it was stated considerable damage had been done, was estimated at nothing. It was let off with a promise to come up again for judgment next spring if called upon. The damage to pasture was also considered trifling, but the plaintiff got 10s. for this; £3 for a chestnut tree, and 30s. for fruit trees. An injunction was refused, and the claim for £50 damages was wittled down to £5. Our advice to readers who have similar cases is, always get your judge at any cost to visit the scene for himself.

* * *

Just at this time when the war in South Africa is on everyone's tongue, it is interesting to come upon a prophetic letter received from a member of the Institute so long ago as August, 1896. As is well known, we have no politics on this paper, but our readers will probably note the following extract from a letter with interest, seeing the trend of events during the past three years and a-half. The letter runs:—"You will be surprised to receive papers from me from Pretoria, but I have been here for some time now, and have seen some queer sights for an Englishman. I have had some up-hill work among these so-called Boers. I have been stopped more than once by armed men; they are all over the place; and *the feeling is very bitter against English people here; I am afraid it will end in war.* The old President seems a nice old man, and one day when passing his house he gave me a very gracious smile and nod. You can see him and his wife any day sitting on the stoop; he smoking and drinking coffee, and two armed men with chairs at each side talking to 'Oom Paul,' or smoking."

* * *

Since the first Christmas number of this Journal was published, we have maintained the time-honoured custom of wishing our many friends the compliments of the season. There is no journal perhaps that is so personally identified with its readers as this is, and year by year serves only to widen the circle of acquaintance and accentuate the feelings of friendship. We include in our good wishes the many readers in foreign countries, and none more so than the unfortunate brickmakers who are now shut up at the seat of war, and those reservists who have perforce exchanged the cutting-off table for an instrument of deadlier nature. For them we sincerely wish a safe return, and to all

A Happy Xmas and a Prosperous New Year.

THE BRICK-EARTHS OF GREAT BRITAIN.—XXIX.

WELDON AND CORBY DISTRICT.

STEPPING over the boundary into Northamptonshire it will be convenient to first visit the limited area in the vicinity of Great Weldon This district is remarkable as a non-clayworking one, in spite of the fact that excellent brick-clays abound. That need not be wondered at, however, if we recollect for how many centuries the good freestone now exploited in the neighbourhood was unworked until a few years ago. The Elizabethan architect who built Kirby Hall, near by, was evidently struck by the stone, and it is now tolerably clear that even the Romans knew and used it. But nobody, apparently, has given a second thought to the fine brick-clays. Even the so-called "slate" of the Lincolnshire Oolite series has been worked, because, no doubt of its resemblance to the more famous Collyweston "slate" to the northwards.

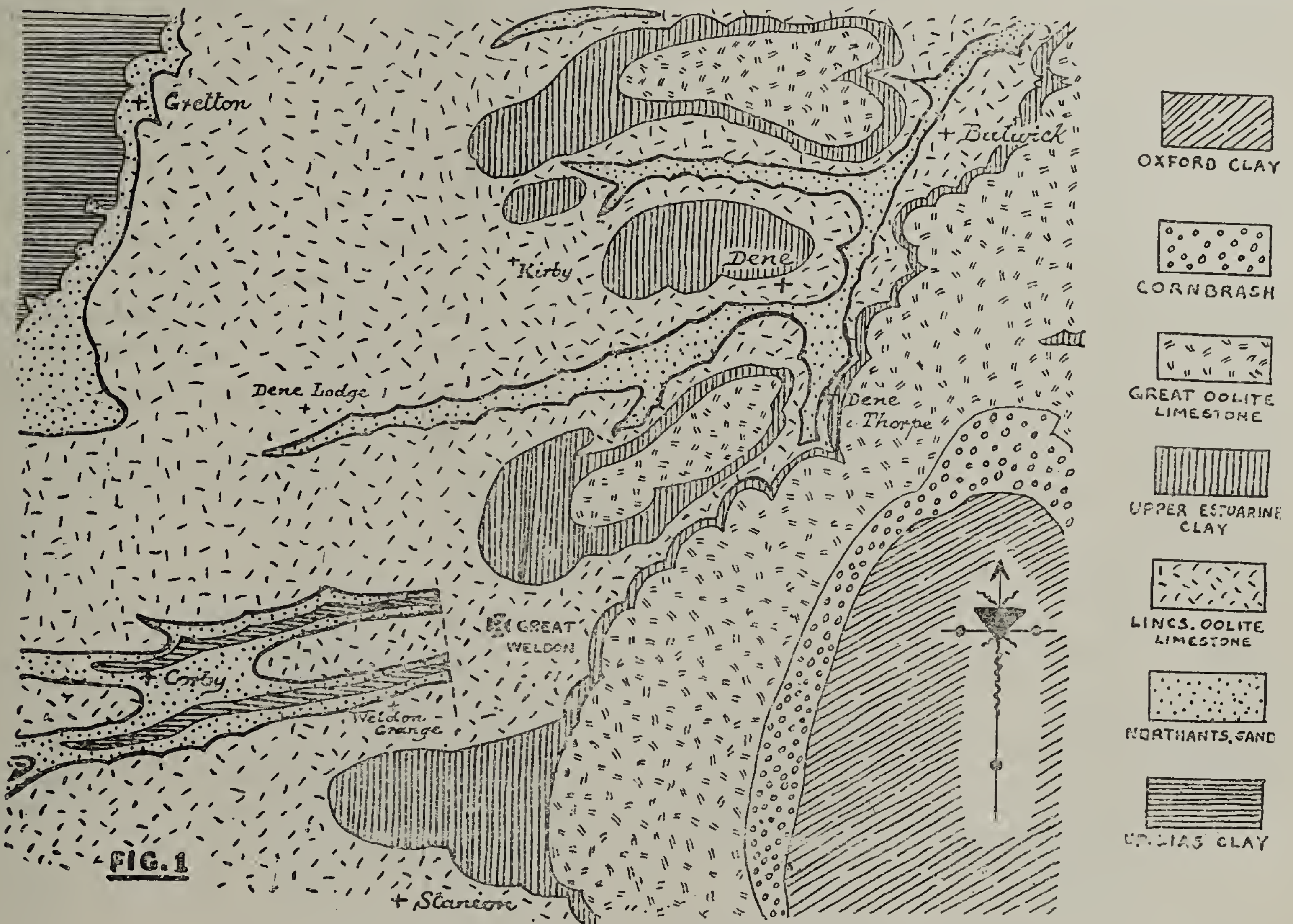

FIG. 1.—SKETCH MAP OF THE WELDON AND CORBY (NORTHANTS) DISTRICT.

The formations represented in the Weldon and Corby districts, as will be seen from the accompanying sketch map (Fig. 1), are as follow :—

1. Oxford Clay, to the east of Weldon, and so much covered up with drift as to be practically unworkable from the clayworkers' standpoint.

2. Cornbrash, also greatly covered over.

3. Great Oolite Clays, doubtfully represented.

4. Great Oolite Limestone, an impure argillaceous limestone of little use.

5. Upper Estuarine Clays, the best clay-bed in the district for clayworking. It is a black unctuous clay when dug into, and for an estuarine formation is remarkably homogeneous. It is best represented in the valley to the north-east of Great Weldon, especially on the eastern side, describing a tortuous path by Weldon Park and on to Dene Thorpe and Bulwick. Large patches of it exist at Dene and in Bulwick Wood, and in the ground round Bulwick Hall. Except in the immediate vicinity of Bulwick village, however, it is hidden under drift and would not, in consequence, pay to work. The Upper Estuarine Clays in the Great Weldon area were tested some years since, and were found to make a good serviceable brick. When the contemplated light railway is constructed there is a strong probability of the district being opened up for clayworking purposes. The clay itself is characterised by its tenacity, and does not shrink materially in the kiln ; it ought to make excellent

tiles also, though it has not been tested in that direction so far as we are aware.

6. Lincolnshire Oolite Limestone, which is the prevailing surface formation in the district. Although of little use to the clayworker it may be advisable to state that mixed with a little of the Upper Estuarine Clays above it, it ought to make a good hydraulic cement. It is a very pure limestone, and has not undergone much secondary alteration. It would doubtless make but a poor builders' lime, but might be hard burnt with about 10 to 15 per cent. of the clay alluded to, for the cement. The rag above the oolite freestone would probably turn out best for these purposes: that is more crystalline than the freestone, and in times gone by has been polished as marble.

7. Northampton Sand, which in this district is iron-bearing, and is altogether too ferruginous to be of practical use to the clayworker. It has not even the redeeming feature of being a true sand except locally.

8. Upper Lias Clay, well represented on both sides of the river Welland. About half-way between Rockingham and Cottingham the highest beds of the series are exposed, and are dug for brickmaking. They would be all the better for fewer iron-pyrites. Not far off, at Great Easton (in Rutland), there is also a brickyard in the same formation; in one part of the pit there was to be seen a layer of ironstone nodules in the midst of the clays. The bricks made from the formation are very similar to those already described as from the same horizon in Rutland.

The Alluvium of the district is not of much interest to the brickmaker. It occurs only in the valley of the Welland, and is of a mixture of clay, sand and lime, the first-mentioned predominating.

The Drift, so thickly strewn over the eastern part of the area, as near Stanion (to the north), towards Upper Benefield, and at Dene is laden with stones, and is not a profitable bed for the clayworker, though the clay present is good enough.

To the south of the Weldon district we find that, as at Corby, the clays of the Upper Lias are brought to the surface by valley denudation. A fault near by has led to the village of Little Oakley being well furnished with all the formations mentioned from the Great Oolite Limestone to the Upper Lias inclusive.

Just outside our present area we find some interesting sections, at Cottingham. Professor Judd gives details as follows respecting a pit in the Lower Oolites, below Cottingham church :—

	THICKNESS. ft.	in.
a. Light brown, sandy beds at the bottom of the Lincolnshire Oolite, say	2	6
b. Dark bluish-black marl, full of plant remains	0	4
c. Marl of lighter bluish-black colour	3	0
d. Whitish and drab lanimated sands	2	6
e. Dark-blue clay	3	0
f. White sand	2	0
g. Ironstone, say	7	0
h. Hard red rock, used for building	20	0

The Lower Estuarine series is dug for brickmaking at Cottingham brickyard. The sands and clays there attain a thickness of at least 20 feet, the beds exhibiting great variations within very short distances.

Dingley District.

This is also situated in Northamptonshire, and the village of Dingley is about 3½ miles north-west of Desborough. The sketch map (Fig. 2) shows that the prevailing formation is the Upper Lias Clay, which forms the low-lying land for the most part covered by Drift to the south, west, and north of the village. In the centre of the district the Northampton Sand occurs as an outlier, and is composed largely of ironstone. It is thickly covered with Boulder Clay.

There are two small outliers of the Upper Lias on the other side of the Welland, at Great Bowden and Market Harborough. The following section is recorded by Professor Judd as occurring at the last-mentioned locality, near the railway station.

Brickyard Section, Market Harborough.

	THICKNESS.
Upper Lias :—	
a. Soil	1 foot.
b. Boulder clay	2ft. to 3ft.
c. Laminated blue clay weathering to a yellow colour, shelly	1ft. to 4ft.
d. Hard, brown, ferruginous band of impure ironstone	9in.
e. Softer and more sandy bed full of fossils	9in.
f. Hard, very ferruginous bed	3in. to 6in.
g. Light blue laminated clays	3ft. to 4ft.
h. Thin bed of sandstone	1ft.
i. Light-blue, laminated clays	5ft.
Middle Lias :—	
j. Laminated, ferruginous, micaceous sandstone ... ... thickness	(?)
k. Brown clay	2ft. to 3ft.
l. "Skerry" or "Kale," with nodules, thickness	(?)
m. Brown clay	2ft. 6in.
n. Blue clay	7ft. to 9ft.
o. "Skerry" (brown sandy stone) ...	1ft. 6in.
p. Brown clay	2ft. to 3ft.
q. Hard rock, dug to the depth of 2ft.	

It would be difficult to find a brickyard furnished with more variable material than this, but the excellent character of the clays in the lower part of the section (especially beds *i*, *k*, *m*, *n* and *p*) has apparently redeemed the more unfavourable parts of the deposits. None of the beds of sandstone are thick, however, and some are inconstant even when traced up for a few yards. These outliers are small, and in the southern half of the Harboro' *massif* the marlstone becomes much attenuated and dwindles away. Seeing that the clays of the Middle Lias are hereabouts the chief horizons operated upon by the clayworker, it will thus be noted that they may be dug without having the expense of removing the troublesome Marlstone Rock bed from above.

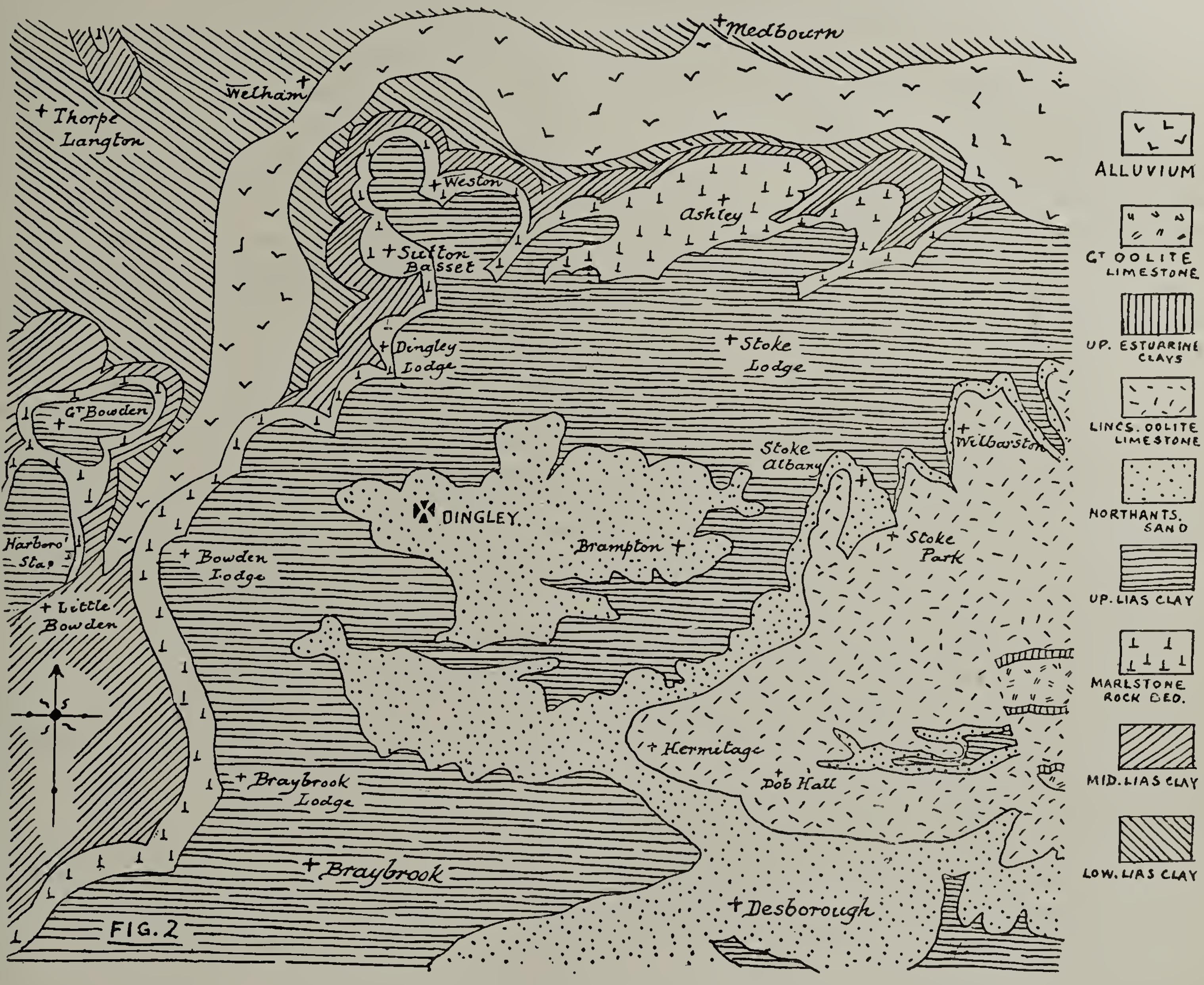

Fig. 2.—Sketch Map of Dingley and District.

Not far away, on the eastern bank of the Welland, near the village of Sutton Basset, the Marlstone Rock bed is doubtfully represented by light-brown sandy stone. A pit gave the following section:—

Brickyard Section, Sutton Basset.

	THICKNESS.
a. Soil and boulder clay	3ft.
b. Upper Lias clay	2ft.
c. Marlstone rock-bed	4ft.
d. Brown clay, containing nodules of ironstone	3ft.
e. Ferruginous, micaceous rock, with many fossils	6 inches.
f. Laminated, light-blue clay containing much mica, weathering brown near the joint planes	8ft.
g. Thin band, similar to *e.*	

Beds *d* and *f* are the horizons principally used in brick manufacture.

The various members of the Lias, including the Lower Lias, have sinuous outcrops on the eastern side of the Welland, from Sutton Basset round to Weston and on to Ashley. But the drift, although it is not thick, masks the actual sites of the outcrops, except at intervals; the Marlstone Rock-bed, however, acts as a sure guide, the weathering of its harder members producing fairly bold features, for the most part readily traced in the field. The strip of Lower Lias exposed is bounded by the alluvial flat of the river.

SOME ESSENTIALS OF SUCCESSFUL POTTERY WORKING.—IV.

KILNS AND BURNING.

MULTI-CHAMBERED KILNS have found but scant favour, at the hands of clayworkers, in the burning of general pottery. Indeed, their use, as will be presently shown, in common with many of the latest single-chambered kilns on the market, is not to be recommended for the burning of pottery in general. Such kilns are best employed in the burning of un-glazed terra-cotta and brick, at a working temperature of some ten or eleven hundred degrees Centigrade, which, together, are not nearly as searching, or destructive to a kiln as are the higher, soaking temperatures ; the volatile and powerful fluxes, and the mixed glazed wares common to pottery. In the majority of cases the wares, in connection with general pottery, are taken up to some thirteen hundred degrees Centigrade, and are subjected, in very many cases, to prolonged exposure to the same, in order to get the fire-soakage necessary for the thorough burning of the wares. Such conditions, taken in conjunction with regular and constant use, will be found sufficiently trying to the best of kilns, let their construction be never so simple, plain, and strong, and the materials be of the best. The many complex kilns on the market are, for the most part, altogether unsuitable for the work of a general pottery. The preservation of details, in the way of draught ways, flues, etc., essential to the effective working of the kiln, must be looked upon as being out of the question in the face of so many disturbing influences.

THE WEAR AND TEAR, even under the most favourable conditions, in connection with fire-holes, arches, bags, linings, and crowns of one's kilns, must always be reckoned with in the conduct of a pottery, more so than in any other section of the clayworking industry that could be named. The high soaking temperatures necessary for the burning of refractory felspathic glazed wares, and to salt-glazing operations in particular, must always prove destructive to the working parts of a kiln. Matters are also influenced, and to no inconsiderable extent, by the nature and properties of the fuel. Certain slips and glazes containing metallic salts, readily volatile under favourable conditions, have also an important bearing on the well-being of a kiln. It is want of attention in these matters, on the part of those interested in the design and construction, that prevents the general acceptance of many new and otherwise excellent kilns in our leading general potteries.

The burning of the largest quantity of good sound pottery, in the shortest possible time, with the minimum expenditure in fuel, together with simplicity and strength in constructional details, must ever be fundamental working principles in the design and construction of a pottery kiln. In the face of these considerations, it is obvious that full and complete combustion of the fuel is of primary importance. And, secondly, that the whole of the available heat be applied to the work for which it is engendered. The two points naturally turn on an effective and intelligent control of the draught. Seeing that these considerations govern, directly or indirectly, all the more important essentials of a pottery kiln—the quality of the fuel and the general manipulation excepted, as being distinct and apart from the construction and design—inventors, and others interested in kiln building, have not unnaturally directed their chief energies to the furtherance of these ends. Hence in the effective combustion of the fuel, and in the due regulation of the draught, lies the trend of all modern improvements in pottery kilns. It will be interesting to note, as briefly as possible, the more important reasons why the introduction of the many new and improved kilns, of recent date, into the clay-working industry, have not met with that general acceptance at the clayworker's hands that, theoretically, their many excellent qualities should command. Clayworkers are proverbially conservative in their methods of work, for in no industry that could be named, are there so many apparent differences between theory and practice, as are found in connection with pottery.

OVER-ELABORATION, in and about the near neighbourhood of the fire-holes, is at the bottom of most of the mischief, and is, as often as not, the immediate cause of most of the failures in connection with many of the newer types of kilns in pottery. Connecting flues and passages, with small leading apertures and channels—often used in conjunction with baffling screens and false bottoms—long, contracted, and tortuous in character, radiating out from the back of the fire-holes to all parts of the kiln chamber, and so arranged for the two-fold purpose of close and intimate mixing of the combustible gases on the one hand, and to give a directive influence to the draught on the other, are, together with suitable methods for controlling the admission of air, characteristic of latter improvements in kiln construction. Such kilns are obviously seen at their best at easy temperatures ; notably, in the burning of ordinary brick and terra-cotta—preferably dry—that is unglazed. They are not without their good qualities in the burning of glazed terra-cotta ; as instanced by coloured, heavy, lead glazes running at comparatively easy temperatures. In short, for working temperatures falling between eight hundred and one thousand degrees Centigrade, where, as in the case of easy lead glazes, getting up quickly and arriving at the proper glazing temperature at a given moment, so to speak, at all parts of the kiln chamber, is of far greater importance to the clayworker, in so far as the glazing effects of his wares are concerned, than any question affecting the complete burning and soakage of the body the glaze covers, nothing could be better than the means employed for the creation and distribution of the heat as found in connection with many of the new types of kilns. However, a rise of some three or four hundred degrees in the working temperature brings about an entire change of conditions, which materially affects the working efficiency of the kiln. At the higher temperatures at which the burning of general pottery is conducted, slagging, at and about the backs of the fire-holes where reducing influences constantly prevail, is always more or less pronounced, in accordance with the slagging properties of the fuel. And this occurring in the mouths of the exits, they become effectually clogged after the first few burnings ; defeating the very object for which they were primarily designed.

APART FROM THE SHAPE OF THE KILN, upon which opinions are somewhat divided, be they round, square, or oblong, *the best kilns for the all-round work of a general pottery are those burnt on the down-draught principle.* That is, the heated draught and flame, instead of passing up through the kiln chamber and out into the air, from the apex of the funnel shaped top, as with the old standard pottery kilns, the draught is made to return downwards, through the centre of the kiln, and out through the cuts on the bottom into the flue, and from thence into the shaft or chimney stack into the open air beyond. Large kilns pay better than small. Eight thousand cubic feet might be given as the capacity for the kiln chamber

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on the one hand up to a capacity of some twelve thousand cubic feet on the other hand. Kilns are often worked, most successfully, with a much smaller area or capacity than that given, but the larger dimension affords a safe working limit. There is no exact rule as to the number of fire-holes necessary for the work, the number will vary with the size adopted, the shape, and sometimes with the purpose of the kiln. However, in general, one fire-hole will effectually deal with some six or seven hundred cubic feet of the kiln chamber; or, in other words, twelve fire-holes are usually sufficient for a chamber of some eight thousand cubic feet in capacity. But no exact rule may be stated on this point. It is necessary, and this matter cannot be too strongly insisted upon, that the fire-brick used for the crown, lining, arches, bags, and in the construction of the fire-holes, must be sound and refractory, and of the very highest quality. The clayworker would do well in allowing no ordinary considerations, as to price, to interfere with his choice and selection of the best fire-brick on the market for work of this character. This will be found to be the truest economy in the end.

The Quality of the Fuel.—Coal in particular deserves more than passing notice, together with certain distinctive properties, peculiar to given varieties, as affecting the burning of pottery. Some coals require a far fiercer heat and an altogether sharper draught than others, for their effective and complete combustion; in a word, they are more refractory. Such coals are generally slatey in character; however, provided they are not, they are an excellent fuel, burning well at comparatively high temperatures, but with no peculiar disposition to slag or clinker, though frequently yielding a somewhat high percentage of residual ash. The softer varieties of coal are generally cleaner in the matter of ash, that is in the higher qualities of soft, easy burning coal, though rich in heavy products of combustion. The best coal for the burning of general pottery should partake of the better qualities of each; a coal falling somewhere between the two extremes. The harder coal would be troublesome on account of its ash, a large part of which would find its way, carried along by the draught, to the interior of the kiln, and there find a resting place on the glazed surfaces of the wares, particularly in the presence of fire-bars, and assuming that the wares are exposed to the direct action of the flame. And further, ash, present in any bulk, would tend to obstruct the draught; and, being a bad conductor of heat, its presence would be directly responsible for much loss. The softer coal, by its ready fusibility, its tarry, gaseous qualities, would only be suitable for easy temperatures—for the burning of soft, lead glazes.

Important as many of these smaller details are, they are relatively small and unimportant as compared with the actual burning of the wares. It is here that the greatest losses, incidental to potting, are most often and commonly found. So long as manufacturers will continue to look upon bright and telling glazing effects, as the outward and visible sign of good and effective burning, they will never be out of the mire. It is generally allowed that, given a good glaze, well developed at all parts of the kiln, any cracked, stunted, or flaked wares, may be safely ascribed to bad clay, or to faulty make or manufacture. This comes of firing up to glaze proofs; to which custom and usage of long standing, has given an altogether erroneous and fictitious value, as a really safe guide in matters pertaining to the burning of pottery. Glaze proofs or shrinkage trials can do no more than give some near approximation to the highest temperature attained in the burning. As to the means employed, and the time covered, the ups and downs generally, to which the kiln and its contents may have been subjected, before the final and usual temperature is reached—upon such points, vital as they are, "proofs" and "trials" are dumb. This is the more serious seeing what is at stake. What damage, for instance, may occur in the earlier stages of the burning operations, in bringing the kiln up and along too quickly; before the water, accidental and combined, has had time to clear? Few clayworkers are aware of the loss occasioned by sudden and violent changes in the atmosphere of the kiln chamber. A kiln may be burning for hours together under circumstances of easy oxidation, and a steady rising temperature, when, suddenly, by large and heavy increments of fuel, the wares may be exposed for several hours to a strongly reducing atmosphere, with all its attending evils. Yet the glaze proofs, or shrinkage trials, will look right enough in the end! And the stunted, blown, and cracked wares, will be ascribed to bad clay. Hence the importance of insisting upon light firing, and at regular, though frequent intervals, as opposed to bringing the fire-holes up to the very top, as is frequently done in the later stages of burning. A kiln heavily fired does not require half the time and attention at the burner's hands, as it would if fired under proper conditions. But the result would amply repay the time and attention so bestowed.

THE BRICK TRADE.

Within an hour of our going to press with this issue a correspondent has placed in our hands a copy of the *Building News* for December 1st, which under the above title makes some reference to our article in last issue entitled "The Outlook."

In that article we stated that the "slump" in the Brick Trade predicted by the *Building News*, through the medium (as it now appears) of the Kent and Essex Brickmasters' Association, was not justified by the present state of trade.

As a reply to this, the *Building News* endeavours to obscure the question at issue by giving a quotation from our Journal of June 1899, in which we made a remark against the over-capitalising of companies. We maintain all that we said in that remark, and fail to see what it has to do with the present position of the trade. The *Building News* is evidently much annoyed that we should have exposed its little weakness in considering the Kent and Essex Brickmasters to be the *only* brick producers in the country; and because we had an item of trade information concerning a possible Brickmakers Combination at Fletton, the *Building News* is ungenerous enough to say the following:—"It is well known in trade circles that The British Clayworker is the mouthpiece of the Fletton masters. The Fletton trade *alone* (the italic is ours) has received any encouragement or help from it. Other brickmakers have generally been favoured with its contempt, if not condemnation." This will be a delicious item of intelligence to readers of this Journal, and only goes to prove to what extent the statements of the *Building News* are to be relied upon. As a matter of fact, if that journal cares to look at our back issues, it will find that while we have given considerable attention to stock brick interests, the Fletton trade has been almost if not entirely neglected. As the *Building News* knows so little of matters concerning the brick trade, we might inform it further, that in all our trade meetings the Kent and Essex Brickmasters have been represented by their own chief, and that the Chairman of the Committee of the Institute of Clayworkers is a leading stock brickmaker himself.

A reversion of the position assigned to us would be more in keeping. The *Building News* has evidently made itself the mouthpiece of the Kent and Essex Brickmasters Association, and proceeds "to favour with its contempt, if not condemnation," the Fletton Brickmasters.

The *Building News* has unfortunately not attempted to controvert our statements except by raising side issues which have nothing to do with the subject. If the question had been one of dispute, and between the Kent and Essex Brickmakers and Fletton, it would have been no surprise to find the *Building News* acting as a blind partizan. But surely when that journal essays to speak of the brick trade generally, it puts itself entirely out of court in narrowing the issue as between two parties, of one of which it is an admitted champion.

SOME CONSIDERATIONS AFFECTING FIRE-BRICKS.

Perhaps the two faults in connection with many fire-bricks on the market are that the bricks, in themselves, are either too fine in grain, and, commonly, much too hard and dense, or they are too coarse, dry, and open, for durable and effective work, The clayworker has to strike a mean, no easy task, falling somewhere between the two, wherein the dual advantages of each, as far as circumstances will allow, are fully worked, while attending disadvantages are reduced to a minimum. Either extremes are positively fatal to a fire-brick, on the score of durability, particularly in the presence of small nodules of iron, peculiar to many fire-clays. These conditions are not favourable for work at high temperatures, often in the presence of fluctuating influences of oxidation and reduction and direct exposure to furnace gases ; some of the volatile products formed in, and during, the combustion of certain varieties of coal are, at high temperatures, exceedingly destructive to the brick.

It will be seen that the fabrication of a really good fire-brick requires skill and judgment at the clayworker's hands. It is a matter of considerable difficulty to arrive at the correct composition, both as regards the size and relative proportions of the respective constituents, taken in conjunction with their properties, of a good, reliable fire-brick. The presence—in the case of a mixture—of a somewhat irrefractory material, even should all other conditions be of the best, will often spoil the whole thing.

The reasons are not far to seek. All clays—there are no exceptions—shrink or contract in bulk, during the operation of drying ; though not all in the same degree. Every clay has an absorption index peculiar to itself, wherein the maximum bulk is attained by the addition of water, over and above that in chemical combination with certain constituents of the clay. There is also a time index, or limit, peculiar to each clay, pertaining to the period in time necessary for complete saturation or soaking by water, and for the time occupied in the expulsion of the same ; both in the accidental and combined states. These are matters for direct experiment and comparison which, for most purposes, may be roughly determined with sufficient accuracy for all practical work, by the clayworker himself. But in no case, and under no circumstances whatever in the manufacture of fire-clay goods, must this important consideration of time, and plenty of it, in the preparation and treatment of clays, be neglected. It is the secret of success in pottery, success in clayworking operations in general, and success in the manufacture of fire-clay wares in particular.

The Shrinkage is thus progressive, from the making to the burning of the wares, inclusive ; that is until the last trace of chemically combined water is expelled ; when, in the strict sense of the term, the articles are no longer clay. However, the shrinkage will go even further ; since the wares by increments of temperature, will progressively shrink or contract the more nearly they approach the vitreous condition. But this has its limitations ; there is a given temperature—a critical temperature—for each and every clay, when all shrinkage ceases, and the clay begins to swell. The particular temperature will vary with the size of the particles, and the composition of the mixture, for each clay present in the mass. In the case of a mixture, the sum of the constituents does not necessarily give the critical temperature or the melting point of the mass ; the weakest clay present, or some particular combination will determine the reaction. The size of the particles will also influence the critical temperature in the case of single clay wares. Atmospheric influences have an important bearing on this question, a reducing atmosphere being particularly favourable in bringing down a clay to this stage, at a comparatively easy temperature. Iron, in the latter case, plays an important part in all cases of reduction ; small nodules, under the influence of high reducing temperatures, will sometimes run together, combining with Silica, forming large and extensive pin-holes in one's wares ; these in turn afford excellent channels for further disintegration. The disintegrating effects of iron are spread more evenly over and through the mass in cases where that element is very finely disseminated throughout, blackening instead of spotting the wares. While the iron remains fully oxidized, no fusible silicates are possible. But the moment reduction sets in, the iron being reduced to the ferrous condition, fusible silicates of Iron are formed, and these, in turn, determine the durability and consequent life of the wares.

After passing, which for lack of a more expressive term is called the critical temperature, the wares begin to swell from the outside and exposed surfaces, gradually extending to the innermost parts. This is frequently accompanied by large blisters from escaping gas—chiefly oxygen—and in all cases by cracks : a broken brick at this stage, when cold, will show quite an open cellular structure. However, the swelling has its limits ; with a slightly higher temperature, and rather longer exposure, the mass will collapse, shrinking away into a pasty mass, and on into liquid slag or glass. Some few clays are, of course, infusible ; others, somewhat rare, only swell at the melting point of platinum ; but all ordinary clays, many so called fire-clays included, will go through all the foregoing stages at about the melting point of steel, and many clays at an even lower temperature. There is every reason for belief that the most refractory clays known would behave similarly, provided the necessary temperature were reached and maintained for a period more or less brief.

There is certainly no product of the clayworking industry which lends itself so readily to the clayworker in order to determine its true worth by direct trial, than the fire or furnace brick. His kilns afford, at once, the most searching and reliable tests for his wares that could well be devised. It would be difficult to subject a brick to more destructive influences, together with hard wear and tear, than is to be found in the arches and flues, directly over and in the immediate neighbourhood of the fire-holes of a hard burning kiln. Fire-holes, bags, and screens, require frequent repairs, and renewals in a hard worked and hard burning kiln. Here are means, ready at hand, for one to directly compare his bricks with the highest and best in the market. Under these circumstances, it is a matter for surprise that so many wide differences in quality exist in the fire-brick.

The standard of excellence should be more regular and uniform in the manufactured wares of this important section of the clayworking industry, on account of the ready facilities for trial and direct comparison afforded, than in any other section that could be named. The indications, from a careful consideration of the foregoing matter, should afford the intelligent clayworker useful clues for successful work and possible improvements in connection with his wares, for the principles herein stated are not altogether confined to fire-clay wares ; they may explain some of the more fruitful sources of stunting and cracking in other sections of the clayworking industry that could be named.

A NEW CONTINUOUS KILN FOR HIGH-CLASS GOODS.

A search among our Patent Office records for some time past, or indeed among the records of foreign patents, does not reveal the development of any important advance in the mode of operation of continuous kilns. The introduction of the Hoffmann kiln was such a striking change from and marked economy upon the single kilns that not much effort apparently has been expended in the endeavour to improve on the coal fired type. It was patented in 1859, and except in matters of detail is operated now as at first. Addition was made as early as 1862 of a means of effecting the warming and drying of the last-filled chamber of green goods by means of heat recovered from cooling burnt chambers, and various modifications of this process have been the subjects of more recent patents.

The great drawback to the Hoffmann kiln of course is its unsuitability for delicate and high-class goods which must not be damaged by the process of firing. It was the waste thus occasioned which led Mr. Guthrie to patent the kiln known by his name. In it the firing is effected between stacked blocks of goods and a baffle wall placed behind the fuel pockets compels the air for combustion to pass by way of the fuel. It gives results superior in quality, but inferior in economy, to the Hoffmann, and the output is very slow, while the goods nearest the fires are considerably scorched.

Various improvements on this kiln have been attempted, in the direction of introducing an independent air supply, for the combustion of the fuel direct from without. Iron grates with ashpits below, admitting a cold air supply, were patented in England by an American in 1884. Horizontal fire-brick grates serving a similar purpose have been patented in Germany, but all these have met with only a partial success in consequence of practical difficulties.

We have now before us the latest development in the way of modification of the Guthrie plan, which bids fair to realise a very marked improvement in regard to management, economy and results. It is the invention of Mr. Arthur E. Brown, B.Sc. (Lond.), son of Mr. James Brown, a manufacturer very well known in the trade, and the kiln is known by the name of Brown's Patent Kiln. It is the outcome of 5 years' continuous experiment at great expense, and its principles are sound and scientific. Its manipulation is at the same time simple.

The particular feature of the invention, to which is due in chief part its efficiency, is the so-called "Regenerative Fire-box." On entering an empty kiln one sees the usual arch with feed and inspection holes, but the floor is carefully paved and provided at intervals with sunk sloping hearths. The hearths are transverse to the chambers of the kiln and in fact mark off the division of them. At the lower side of the slope of the hearth and transverse to the chamber is seen a vertical fire-brick grate formed by large vertical fire-blocks with coarse slits between them. In the fire-box formed by the hearth and grate is placed the fuel for the kiln fires.

This is all that is visible of the working parts of the kiln with the exception of one slotted division wall across the middle of each barrel of the kiln. The methods of maintaining the fires and extracting the smoke are not obvious until pointed out in detail. The goods to be burned are stacked on the paved floors between the fire-boxes, and no fuel is dropped among them.

In explanation of the term "regenerative" as applied to the fire-box, it is shewn that the air for combustion of the fuel in the fire-box is brought to the grate from outside by a set of circuitous flues immediately below the paving of the chamber floor behind it. Proper means of distributing the air are pro-

Exterior of Kiln.

vided, and it is delivered to the fuel, heated by the heat transmitted through the paving of the chamber, at a temperature of over 500°F. It will thus be seen that heat radiated downwards from a chamber just burned is intercepted by the air passing under it and used for assisting the combustion of the fuel for the succeeding unburned chamber.

This ingenious arrangement not only recuperates heat which otherwise would pass away into the ground, but also serves to effect a specially efficient combustion of the fuel in the fire-box by virtue of the high temperature of the air supply.

Fig. 1.

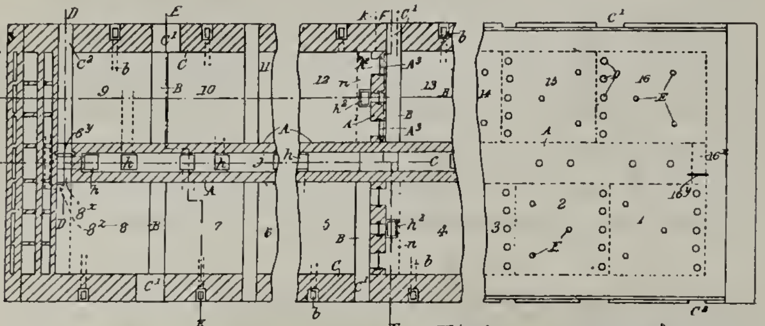


Fig. 2

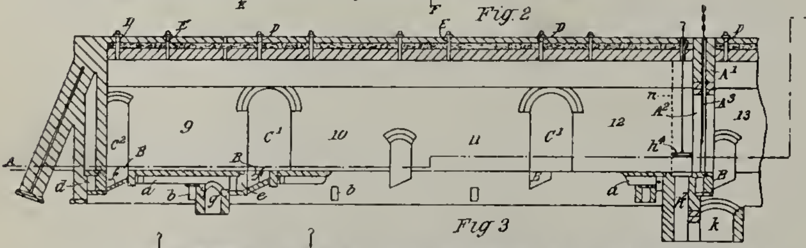
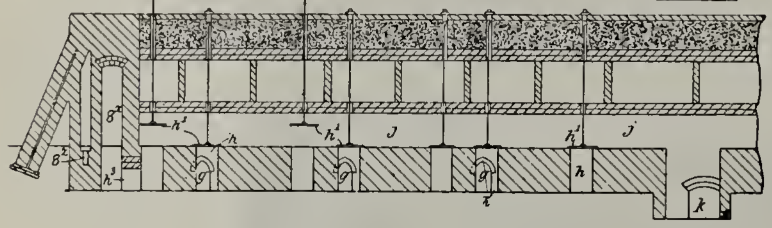


Fig 3



The provision of an independent air supply to each fire-box also admits of entire control of each fire, and of its maintenance or extinction at will. This control is possible because of the adoption of a refractory material for the grate. An iron grate must have a *cold* air supply, which must not be unduly restricted during combustion for fear of destroying the iron.

The vertical refractory grate is a device of the first importance in that it serves two purposes hitherto not attained. It localises the intense combustion to a thin line along the top edge of the grating, and it effects automatically the removal of ash and clinker from the seat of this combustion. The body of fuel remains almost entirely below the floor level of the kiln and at a comparatively low temperature, reaching high incandescence only when it finds its way to the grate. The ash settles on the dead hearth and absorbs the molten clinker as it drips vertically down in front of the grate, and prevents it attaching itself to it.

Such then is the action of the regenerative fire-box in providing the heat requisite for burning the goods. It serves also as a means of withdrawing the smoke or products of combustion.

In a continuous kiln there are always provided several chambers full of green goods in advance of the chamber being fired. Through them are passed the hot products of combustion from the burning chamber, and these give up part of their heat to the cooler goods, performing the operation of steaming. In so doing they become cooled to a comparatively low temperature. These chambers, it will be understood, have not as yet any fuel in their respective fire-boxes. Flues provided behind the grates, connected with the main smoke flue of the kiln, allow of the passage away to the chimney of smoke, which reaches them through the slits in the grate. The flues are controlled by dampers, so that any desired set of grating slits may be brought into action. It will be seen that this method of withdrawal of smoke takes effect at the bottom of the chambers, ensuring effective burning of the goods placed lowest in them and also across the whole width of the chambers, ensuring equalisation of the draught.

In general form the kiln for ordinary bricks is constructed with two parallel barrel arched chambers, the main kiln flue being placed in the wall dividing them.

The ends of this kiln are square, and the end chambers on each side of the division wall are connected by simple tall narrow "connecting passages," which, strange to say, though only some eighteen inches wide, allow free and uninterrupted passage of the heat, so that practically no time is lost in turning the ends. As mentioned before, a transverse wall divides each barrel in the middle, and each wall has several tall narrow openings in it to allow of the free passage of the heat. The narrow "connecting passages" and the narrow openings in the transverse walls are controlled by sheet-iron dampers, which are used to regulate, as may be found necessary, the admission of cold air to the cooling chambers. They are an important factor in the control and management of the kiln. When chambers not adjacent to these damper-controlled openings are filled with green goods, the closing partition is formed in the usual way with paper pasted on the goods at the back of the chamber. The paper is burned off by the advancing heat when no longer required.

The cooling of burned chambers of goods and carrying forward of the heat is accomplished in the manner typical of the continuous kiln, but with different intent. Cold air, which has access from outside, through the chamber being emptied of its burned goods, is drawn forward by the draught of the chimney, cooling the successive chambers in a gradual and progressive manner, and itself becoming gradually heated till it arrives at the grate where intense combustion is taking place. Arrived here it does not serve, as in most continuous kilns, in effecting combustion of the fuel, but acts instead in diluting the very great heat produced along the upper edge of the grate. It is in practice adjusted in volume to five or six times that of hot gases of combustion, and the immediate reduction of the intense heat to a correct temperature for the burning of the goods in the chambers, prevents overheating and damage of them.

Fig. 5.

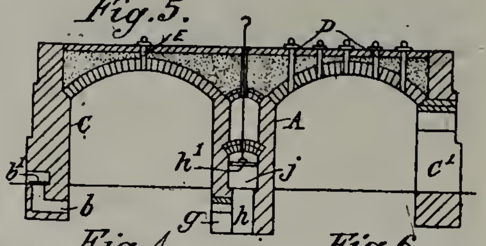


Fig. 4.

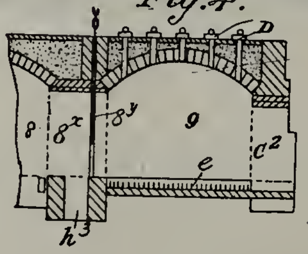
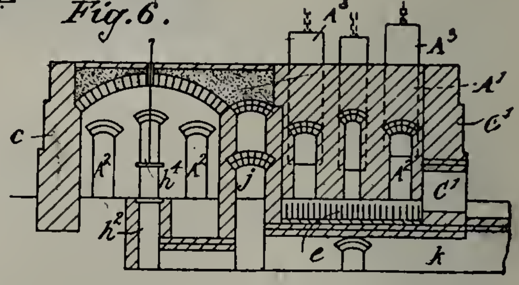


Fig. 6.



Proceeding now to the method of firing the kiln, the first noteworthy point is the ease with which lighting up is effected.

In a Hoffmann or Guthrie kiln, lighting up is a serious proceeding, taking much time and fuel, and giving an unsatisfactory burning of the first chambers. In the kiln under notice, the starting is as simple as the lighting of an ordinary intermittent kiln. Two or three chambers having been filled at one end of the kiln, the first fire-box is filled with large coke up to the top of the grating. A small opening is left in the wicket or loop of the first chamber through which some lighted coals or wood may be introduced.

The air supply flue is opened and for a couple of days during steaming, the opening in the loop may be left unclosed to prevent too rapid heating of the goods. Then it may be closed and the fuel fed in from the top.

The fire gradually spreads along the fire-box, across the chamber, till the whole is incandescent and then the heat may be rapidly raised so that the first chamber is finished in five or six days. The next five chambers take about a week, and up to this time, air is admitted only by the air flues connected with the fire-boxes. Now however, there being a sufficient body of heat and it being necessary to commence the cooling of the burned chambers, the first loop is opened and air admitted direct to the first chamber. After this the chambers are burned in from fifteen to eighteen hours each and the dampers in the division walls or connecting passages are employed to regulate the admission of the cold air as may be found necessary.

In spite of the rapidity of burning, there is no difficulty in getting the burned chambers cool enough for drawing the goods, and this is chiefly due to the fact that the cinders can be withdrawn from the fire-boxes as soon as the loops are opened, and there are no hot cinders among the goods. A remarkable feature observed when emptying the fire-boxes, is the mass or curtain of clinker which stands in front of the grate, not attached to it and yet preventing dust and ashes from falling through the grating slits.

In practice three or four fires are kept going in different stages of intensity. The front box contains fuel reaching incandescence solely by virtue of being heated by the passing gases. Air has not yet been admitted, but as soon as it is, intense combustion immediately commences and shows as a brilliant line of fire where the air reaches the fuel through the grating. Careful measurement has shown that the air supplied to the hottest fire is very little in excess of that required theoretically for perfect combustion, and not, as in the case of steam boilers, nearly double the theoretical amount. This, added to the fact that the air is heated in the regenerative flues to a temperature exceeding 500° F., shows that the combustion is of the most perfect and efficient kind. The arrangement is such also that where it is desired to use hard coals such as anthracite, or inferior fuels such as lignite or peat, a blast fan may be used (not interfering with the chimney draught) in order to obtain the requisite pressure of draught through the fuel.

Interior of Kiln.

The warming and drying in advance of newly-set chambers is arranged for by a simple set of flues which serve to bring to them in succession, air warmed in cooling burned chambers, this operation has been so long understood that it is not necessary to describe it more fully.

The practical management of the kiln is exceedingly simple, as the burner is not concerned in any way with the intricacies of its construction, and has but simple operations, easily learned, to perform. It does not demand the close attention and exactitude of firing of the Hoffmann kiln, and even if neglected is not in danger of extinction or over-heating. The setting of goods in the chambers involves no complications, and may be done in any of the various ways known for different classes of ware. When in full work, the burner may easily regulate the temperature to be highest either at the top or bottom of the chambers or equal throughout. The intensity of combustion, too, can be regulated at will, by means of the air supply and the frequency and amount of feeding, and it is throughout impossible to find any part of the operations which does not admit of complete control. Sunday firing is no longer necessary as in other continuous kilns, and arrest of progress for four or five days at a stretch may be made, the heat lost by radiation in such a period being quickly regained on resumption of active working.

Turning to the question of results, we may say that those we have seen give promise of a wide adaptation of the kiln. At the present time only red and white bricks of the South of England have been extensively burned in it, but with a most striking uniformity and absence of waste. Very few of the bricks next the fire are even scorched, and the bricks exhibit a delicacy of colour such as to satisfy the most exacting. Doubtless its suitability for other classes of clay and high temperature will very soon be proved, but its superiority for delicate red ware is unquestionable. In the matter of economy of fuel, the scientific efficiency which we have pointed out is proof of its giving satisfactory results in this respect. The inventor does not put forward any extravagant claims for it in the matter of economy, being content to claim equality with the Hoffmann, and relying on the excellence of quality of the products and absence of waste as recommendations of the value of the kiln.

Patents have, we understand, been already taken out in England and the Colonies, in the United States and on the continent of Europe.

The accompanying drawings illustrate the general form of the kiln. A small kiln is shewn with sixteen chambers each capable of holding six or seven thousand ordinary bricks. It will burn from fifty to sixty thousand bricks per week. On account of the small size of the chambers, alternate wickets only are made large enough for the setting and drawing of the bricks, the smaller ones being provided for emptying the fire-boxes of ash and clinker only. Kilns can of course be constructed with chambers to hold up to twenty-five thousand bricks each, for an output of 250,000 bricks per week. Double kilns have already been constructed, one of which we illustrate, for an output of nearly half a million bricks weekly.

In the interior view the floor and division walls are not completed.

This kiln has 28 chambers, to hold 20,000 bricks each, and is fired at two opposite places at once. There is no chimney, the draught being produced by a large Sturtevant induced draught fan, and the hot gases delivered to Blackman drying tunnels for drying the bricks to be burned in it.

We think we have said enough to convince the reader that there is here a distinct advancement in methods of burning, and one that may well be made the subject of closer investigation by all interested.

Death of Mr. T. C. Fawcett.—It is with great regret we record the death of Mr. T. C. Fawcett, of Whitehouse Engineering Works, Leeds. He was amongst the earliest of Brick-Machine Makers in that town, having taken up that branch in the year 1867, when he found plenty of scope for his engineering skill and energy. He made clay-working machinery a speciality, and from time to time took out many patents for improvements in the same, which have been very successful and are well known throughout the clay-working industry at home and abroad. Four years ago he converted his business into a private limited liability company, so that he could leave the management in other hands and seek that rest which he had so well earned, having been in active business some 37 years. He died at his residence, Parkhurst, Chapeltown Road, Leeds, on October 27th, 1899, at the age of 60. He was a kindly man, a considerate employer, and a typical Yorkshireman.

GRIT FIRE-BRICKS.

A HINT FOR THE ENTERPRISING.

THE brickmaker accustomed to using plastic clays can have but little idea of the curious compounds which pass by the name of "clay" in certain granite districts. True enough, we get the finest clay imaginable there in the shape of pure white kaolin which is plastic to a degree, and suitable for making the best clay goods when judiciously employed. In the same granite districts, however, we get quite a different material which is also known as clay though it contains but few attributes of that substance. We allude to what ought properly-speaking to be termed an argillaceous grit. This material, although it is largely composed of pure quartzose sand of the size of shot grit, is frequently suitable for the manufacture of excellent fire-bricks of an acid type. Such bricks may not be altogether suitable for the linings of furnaces where a fairly basic ore is to be smelted—as for instance in the reduction of ordinary limonite or hematite iron ore—and it could not be employed for the manifold purposes to which the normal fire-bricks of the Midlands are used. But, for a special type of fire-brick, this argillaceous grit ought certainly to be more extensively dug. We have quite a number of silica bricks in the market, and everybody is familiar with the semi-basic bricks which ordinarily go by the name of fire-brick, whilst basic bricks of magnesite and the like are not unknown. But this grit fire-brick is made from a material which is neither as acid as a true silica brick nor as basic as the normal Midland types made from the underclays of coal-seams, or from "clench." It occupies a position between the two, and is unquestionably useful for medium-acid ores which so frequently try the temper of the other two varieties mentioned. True argillaceous grit of the type indicated is the result of the decomposition of granite and is never found very far away from that rock. Its sandy, gritty character and the neighbourhood of kaolin often prevent its being favourably regarded from the clayworkers' standpoint, and the result is that in Devon and Cornwall there are extensive deposits of the material at present known to but very few people—and these are not, except in two or three instances, clayworkers. Occasionally, this argillaceous grit is really granite decomposed *in situ*, and ought in that case to be called by its scientific name carclazite. There is only one little difficulty connected with it, and that is where the grit contains but little clay, barely enough to hold the brick together when it first comes from the mould. This difficulty may to some extent be surmounted by making the brick fairly dry and pressing it. Better still to supplement that by most careful firing (to commence with) in the kiln. The too rapid application of heat in the kiln will frequently reduce these grit bricks to a heap of dry grit, which, of course, is useless. Again there is a natural tendency on the part of argillaceous grits to furnish an exterior coating of clay from their own substance. The moisture in fact leads to a kind of "sweating" which induces the external coating of fine clay to form. This, in addition to assisting to hold the brick together, imparts a fine surface, better than the rough sand and grit could do alone. There is a future for this material in making medium-acid fire-bricks.

Brickmakers Insurance.—All brickmakers should support their own company, not only on moral grounds, but from the fact tha its rates are low, its profits divided and its security ample.

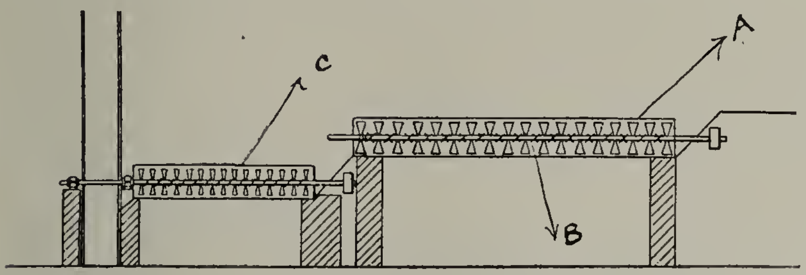
THE SEPARATION OF STONES FROM CLAY.

For many years past attempts have been made to introduce a machine that will assist brickmakers in the troublesome operation of separating stones from clay. So far the ideal machine has not been found, although it is stated that in the United States the separation of stones from clay is as easy an operation as shelling peas. But they do many things on the other side that are impossible to us here.

The latest contribution to the solution is a patent introduced by Messrs. Rossborough & Pile, of Dublin, which claims a novel and expeditious manner in which clay containing many stones is disintegrated so as to loosen and separate the stones from the fine material, by means of a special chamber.

We are inclined to think that the question of separating stones from clay lies more frequently in the path of the plastic than of the semi-dry brickmaker. This invention is obviously intended for the latter process, but we do not think it would be likely to find a wide application thereto. Clays for semi-dry work are seldom worth using if containing many stones.

The plastic brickmaker, however, is constantly dealing with stony clays, and we therefore think it worth while to examine the merits of this process from his point of view. Plastic clays containing stones are frequently very valuable either on account of colouring properties or plastic properties, when wanted for mixing with sandy earths.



We have seen other methods of getting rid of stones by drying the clay and treating by machinery, which are advocated in preference to the older method of washing with water in a washmill. We are of opinion, however, that a maker who has room for wash-backs and has plenty of water will do well to hesitate before adopting any other than the old method. To begin with the machinery will take at least as much power as a washmill and we may confine ourselves to the comparison of "backs and water" versus "coal for drying."

The clay for 10,000 bricks requires about 4,000 gallons of water for washing, which at 6d. per 1,000 gallons amounts to 2s.

The coal to dry clay for 10,000 bricks would be at least 5 cwt., costing 5s. Thus where washing is possible the question is quickly solved. The best authorities are unanimous in pronouncing for the washing method.

In the patent in question the essential chamber is *c*, a cylinder in which a number of radial arms or beaters on a central revolving shaft break up the dried material and so separate stones from clay preparatory to sifting through screens. The shaft carrying the arms is rotated at a speed of about 240 revolutions per minute. The clay may be heated while in the cylinder *c* by flues supported in the masonry beneath it.

Previous to treatment in the cylinder *c* the clay may be dried in any usual manner, but the inventors show a cylindrical conveyor *a* in which this may conveniently be done. This cylinder is heated by flues beneath it, and within it is the revolving shaft *b* with blades which propel the clay towards the second cylinder *c*. This shaft acts only as a conveyor and revolves more slowly than the one in *c*.

Any convenient arrangements may be adopted for bringing the raw clay to *a*, passing it to *c*, and screening or sifting it after the beating process.

BRITISH CLAYWORKERS' MUTUAL INSURANCE.

A YEAR'S WORK.

We have received a copy of the Report and Balance Sheet of the British Clayworkers' Mutual Insurance Corporation, which will be presented at the Annual Meeting of the shareholders, to be held to-day (Friday). It is in every sense a remarkable production, and is a bitter little pill to swallow for those unerring critics who predicted for the Company a speedy and crushing collapse. To many of them we daresay the wish was father to the thought.

The most remarkable feature of the Report is that the Company, with its subscribed capital of nearly £15,000, has not had occasion to touch one penny of this sum, while upon the amount called up it has been able to pay a dividend of 10 per cent., write off its preliminary expenses of £291 7s. 9d., and carry the sum of £200 to reserve. It is a remarkable outcome of a plucky little fight against monopoly and extortion, and we shall be much surprised if the result of its first year's work does not rally the whole of the clayworking trades to its support.

The credit of success lies mainly with the directors, who with a rare regard for the shareholders' pockets in preference to their own, have conducted the affairs of the Corporation with untiring energy and without drawing a penny for their labours.

There is a moral in this report that the insurer should take seriously to heart. Had the Corporation been conducted at even a tithe of the expense which—legitimately enough—falls upon every Insurance Office, it would have, undoubtedly, shown a balance on the wrong side. And this proves conclusively that the premiums charged by the Mutual Company are placed at the lowest possible figure, and that other Companies, with their big commissions and heavy working expenses, *are conducting brickmakers' insurances at a loss.* It is unnecessary to attempt to prove this statement further, as it is freely admitted by the rate-cutting Companies, that their object is to starve out all mutual combinations by doing business under cost. But they reckon without their host, as far as the clayworker is concerned. It does not need a very cute man to know that Insurance Companies do not carry on business under cost without an object in view, and clayworkers who assist them in such schemes are only putting a rod in pickle for themselves.

Most men in business would refuse to deal with a firm which exacted 30s. for an article one year, and as many pence for the same article the following year. This is the position with regard to insurance, and while the insurer "sits tight" there is no fear of giving in to the enemy. The British Clayworkers' Corporation has had to fight hard for the reduction of a high rate—by a strange irony it has now to fight against the continuance of a low one.

A METHOD OF LUBRICATING DIES.

Mr. William Wood, of Liverpool, has recently taken out a patent consisting of a mouth-piece and die for wire-cut bricks, and the claims in respect of it are chiefly for the method of lubricating and the form of the convergence towards the outlet, which are stated to avoid over-wetting of the clay surface and cracking at the corners.

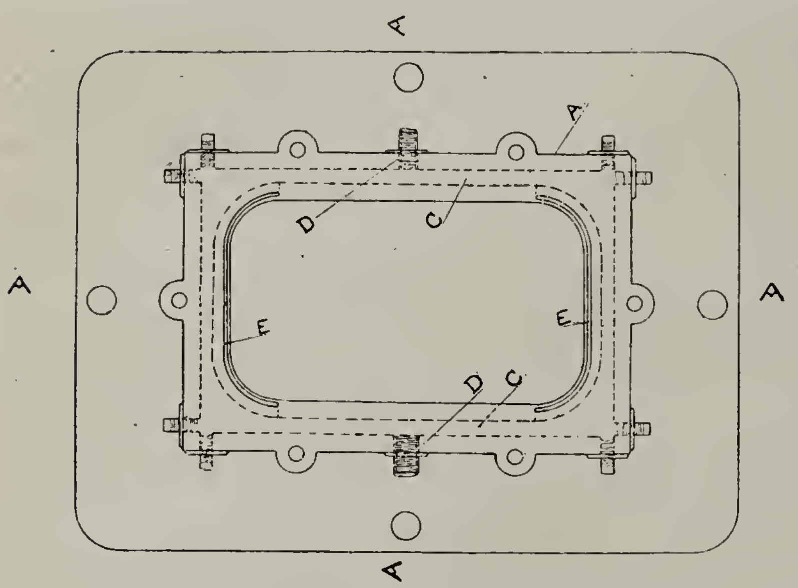


FIG I.

The mouth-piece *a* has a channel *c* all round and close to the opening through which the column of clay passes. Inlet and outlet pipes *d* are provided communicating with *c*. The amount of lubricant, which is presumably steam, is adjusted by cocks on the pipes. Slots *e*, communicating with the channel *c* by perforations, are cut round part or all of the inner surface of the mouth-piece and serve to distribute the lubricant on the clay column in a manner to be determined by trial

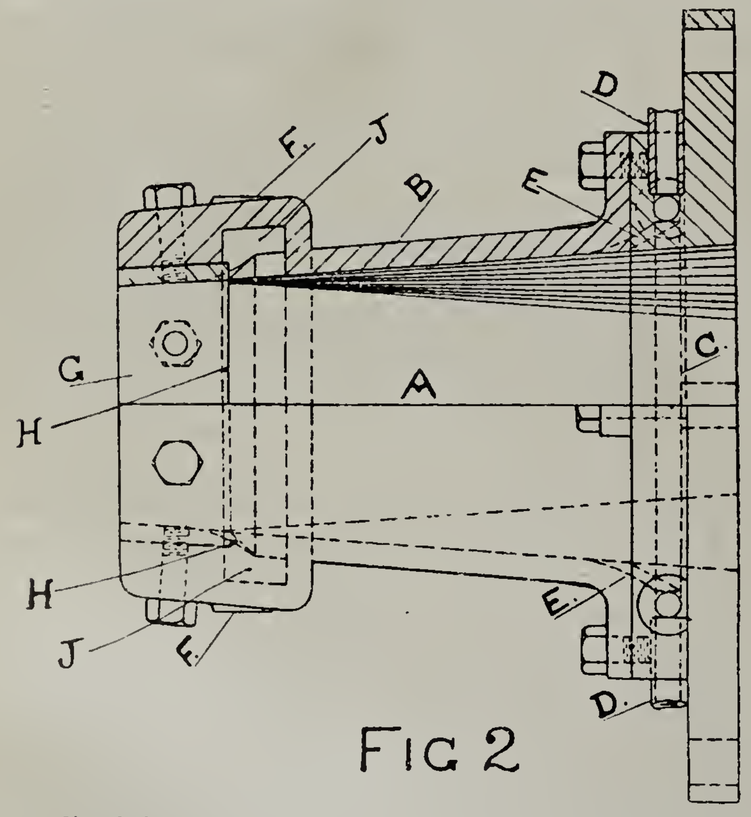


FIG 2

The die *b* has renewable plates *g* which give final shape to the clay column. The inner edges of *g* are scalloped or cut partly away at *h* to allow of the flow of lubricant from the channel *j* on to the clay column to such extent as may be found by trial to be suitable. Pipes *f*, *f* serve for inlet and outlet of lubricant to the channel *j*. Thus it will be seen that the clay is lubricated at two points in its passage, at *e* and *h*.

The description in the specification is difficult to follow and incomplete. The apparatus is presumably all in metal. The close lines in Fig. 2 are evidently intended to indicate merely the convergence of the die from the larger mouth-piece with rounded corners, to the smaller die proper with square corners. Fig. 1 is a front view of mouth-piece alone. Fig. 2 is part elevation and part section (vertical longitudinal) of the whole.

We should think the die would be good and effective when once the correct apportionment of lubricant had been determined at the two points. It would, however, not be an easy matter in the first instance to find out the most suitable extent of the slots *e* and the best scalloping of the plates at *h*. These, of course, would have to be found for each clay as occasion arose.

REVIEW.

"The Workmen's Compensation Act, 1897. Being a Digest of Cases tried in the Court of Appeal. With an introductory Chapter on the Act." By William E. Hughes, B.A., and H. Greville Montgomery. London: 43, Essex Street, Strand, W.C., 1899. (Price 2/6 nett.)

This is a useful practical guide to the Workmen's Compensation Act, and will no doubt be of much service to both legal practitioners and to employers of labour. The first part is an introductory summary which puts in concise form the scope of the Act and as to how far it is an extension of the older Employers' Liability Act, the kinds of accidents and employments to which the Act applies, a definition of those who are entitled to receive compensation, the compensation itself, limits of time for making claim, and the consequences of serious and wilful misconduct on the part of workmen.

Part II. gives a brief epitome of cases tried, with the points decided in them, and this is subdivided into headings determining the "Liability of Employers," "Application of Act and definitions," definition of the terms "about," "in, on or about a building," "scaffolding," "repair," "factory," and the "amount of compensation."

Part III. is a digest of Cases; and Part IV. gives the chief Statutes and Rules under the various Acts.

There is nothing to criticise adversely in this little book, it being in the main a record of facts. But, we might suggest that in future editions the introductory portion should be extended. The Workmen's Compensation Act has been drawn up very carelessly to admit of such a mass of legislation in reference to it in such a short time. This work will be useful to those who seek to amend the Act, or rather to consolidate the whole of the Acts relating to the employment of labour in the various categories enumerated. We can imagine nothing more fruitful of controversy, for instance, than the ridiculous enactment which provides that if the accident is attributable to the serious and wilful misconduct of the workman injured, he shall not be allowed any compensation in respect thereof. What is "serious and wilful misconduct"? It appears to be simply a shifting of the responsibility to the employer to prove negligence on the part of the workman, instead of the workman having to shew negligence of some sort on the part of the employer. However, we must not criticise the shortcomings of the Act, they are too numerous for a short article. The work may be thoroughly recommended to our readers, and it may be noted that it is proposed to publish at the end of each sittings of the Court, in cheap form, a digest of those cases affecting the Act, so that the book may be kept up-to-date from sittings to sittings.

CHINA CLAY AND CHINA STONE.

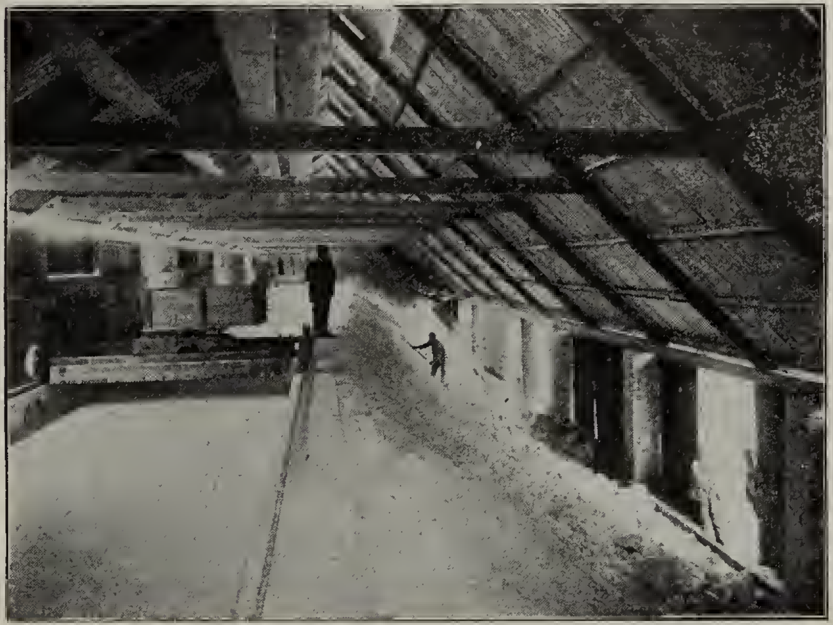
THE china clay industry is one that has latterly assumed considerable importance in the extreme south-west of England. The deposits in this country are found only in two districts in Cornwall, the larger one being in the neighbourhood of St. Austell, the other which is inferior in area and quality, is in the neighbourhood of Penzance. China clay is also found and worked in the south-western part of Devonshire. With these exceptions the article is not found in any part of the British Isles.

WHEAL REMFRY CHINA CLAY PIT.

GROUND CHINA STONE MILLS, SHOWING MILL HOUSE, WATER WHEEL, AND KILN.

A popular error prevails that china clay is used exclusively in the manufacture of porcelain, but it may come as a surprise to many of our readers to learn that probably not more than twenty per cent. is used for this purpose, the rest being utilised for paper-making, sizing and bleaching; only a comparatively few of the works produce a sample of clay which has the necessary elements for the manufacture of china and earthenware.

To show the development of the industry in the early part of the present century the whole of the output of Cornwall and Devon did not reach fifty thousand tons, whereas at present nearly half a million tons are annually shipped. When it is considered that for every ton of marketable clay produced, it is necessary to deal with ten times that quantity of *débris* which is practically useless, it will be seen that a large amount of work, involving considerable labour, has to be employed in order to turn out the present requirements for the market.



INTERIOR OF DRYING KILN.

The china stone industry is confined to a still smaller area than that of china clay, as it is found within about one square mile. This is one of the allied products of the china clay trade. It is raised or quarried in its natural state, and has the appearance of decomposed granite, and has to be ground to a very fine powder before it is used. It is then mixed in a certain proportion with china clay and other raw materials to make the body of the ware. The bulk is shipped in its raw

GROUND STONE MILLS, SHOWING SERIES OF GRINDING PANS.

condition to Staffordshire where it is ground by the millers in that district. A few firms in Cornwall, however, have their own mills to supply the Continental and other markets.

By the courtesy of Messrs. J. Rogers & Co., of Truro, we are able to give some photographs of their works. The Wheal Remfry Works, which is the largest, is situated about 8 miles from St. Austell and 11 miles from Truro. This important works has been going now for over forty years, and was acquired by the present firm about twenty-seven years ago. The output is one thousand tons per month, of which one half is an excellent porcelain clay, and is used in the manufacture of the very whitest china. More than one of the leading china makers in this country have continuously used it for over twenty years. We also give photographs of a new china stone grinding plant, which was erected by the above firm about two years ago. The power is generated by a large iron waterwheel which is continuously working night and day, and although Messrs. Rogers have only recently entered this branch of the trade, we learn that the product of their mills has been highly satisfactory wherever used, the difficulty being to supply a sufficient quantity for the demand, as the turnout is naturally limited to the amount of power at disposal.

RAILWAY SIDING INTO WORKS.

The British Clayworkers' Mutual Insurance Corporation, Ltd.—All clayworkers should obtain a copy of the Annual Report issued by this company, which is a striking instance of the value of trade combination.

Bricks for Furnace Arches.—A new form of fireclay brick for furnace arches is now being used in the United States, the main objects of which are to enable a flatter roof to be built, and to prevent the dropping out of bricks due to the expansion or contraction resulting from sudden changes of temperature. They are larger than ordinary bricks, and their peculiar form is such as to cause them to dovetail or lock together when in place, the joints being in two planes and not radial to the arch. The skewbacks have a flat base for the seat in the side walls, and a dovetailed face to fit the arch bricks. A very extensive displacement of the side walls would be necessary before a brick could drop out of the arch. These bricks are said to be especially adapted for furnaces for treating malleable iron, as they will stand longer in the "bung" or cover of the furnace, and will not drop out when the bung is lifted off. The pattern is a patented one.

MECHANICAL DRAUGHT IN BRICKYARDS.

To the Editor of "THE BRITISH CLAYWORKER."

DEAR SIR,—We observe with much interest the article in your November issue on mechanical draught; and being large makers of fans for this purpose, we quite agree that such induced draught is of great value for boilers in large plants, where fuel economisers are used.

In small plants however, using only one boiler, it is much better practice to dispense with the economiser, to condense the exhaust steam (after removing the oil) in a steam tunnel brick dryer, and to pump the hot water of condensation direct into the boiler.

Where down-draught kilns are used, the waste heat can be led with advantage to the dryer by the use of fans, always providing that rapid cooling will not injure the bricks. We have dryers using such waste heat, drying as many as 120,000 bricks daily each installation.

But our extensive experience leads us to altogether disapprove of substituting induced draught fans for the stack of a continuous kiln. In the first place, if such a kiln is properly worked, the gases go away in a very moist condition and at quite low temperatures, and so have extremely little drying value. Such moist gases would corrode the steel fan in a very short time, and render it worthless.

The case is quite different from boiler practice, where the gases are dry. For this reason an iron or steel stack for boiler draught is unobjectionable, but no one would think of using such a stack for the moist gases from a continuous kiln.

An oil engine is quite unsuitable for continuous running night and day. Apart from the matter of corrosion, continuous draught on a kiln could only be ensured by the use of a duplicate installation of fan and motor, one to be used when the other is stopped for cleaning, &c.

Yours faithfully,
THE AMERICAN BLOWER CO.,
CHARLES ERITH,
Manager.

70, Gracechurch St., London, E.C.,
20th November, 1899.

To the Editor of "THE BRITISH CLAYWORKER."

DEAR SIR,—Referring to the able and interesting article which appeared in your November issue, on "Mechanical Draught in Brickyards," I have long advocated the advantages of induced draught for drying and burning bricks, &c. I have used it successfully as far back as the year 1886, both at the Millcroft and Caledonian Brickworks near Glasgow, and at that time obtained Letters Patent No. 8067—1886, for a method of burning bricks in which a fan supplied the necessary draught. And although I am not now interested in the patent referred to, I still think there are many advantages in mechanical draught that are worth the consideration of brickmakers, even if used in conjunction with a chimney. I shall be pleased to hear through the columns of your valuable Journal the experience of clayworkers in a similar direction.

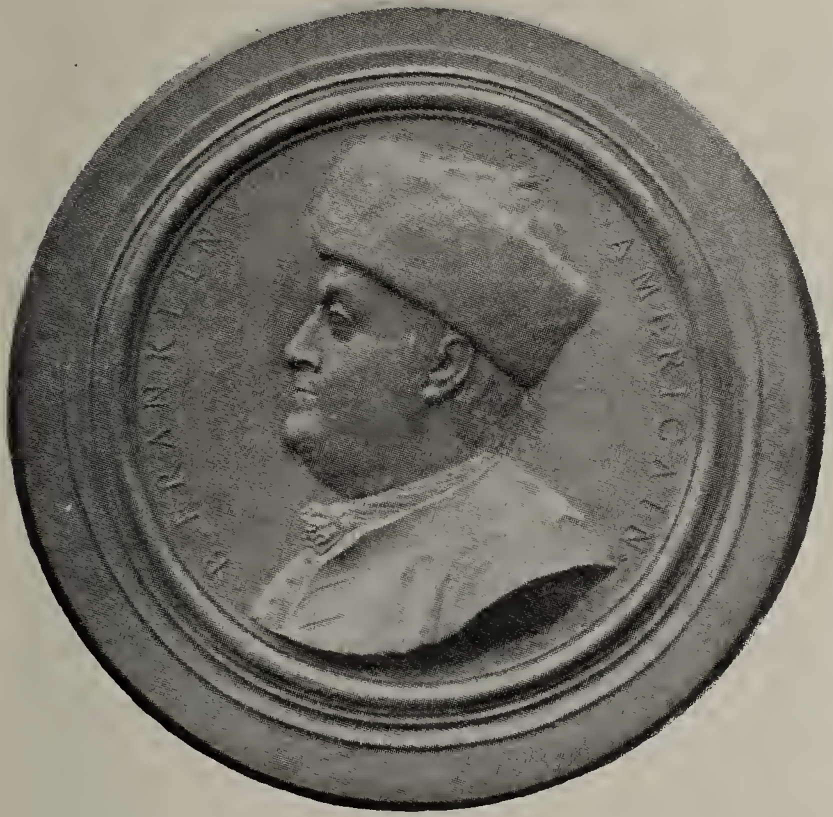
Yours faithfully,
P. J. MILLIGAN,
Manager

Dolphin's Barn Brickworks,
Dublin,
Dec. 2nd, 1899.

ROMANCE IN TERRA-COTTA.

THAT the old Babylonian terra-cottas experienced many vicissitudes nobody will gainsay—the circumstances under which they have been found are sufficient proof. But, they are not the only examples by the artist in clay that have a history in the world of romance, and a latter-day work about to be alluded to is almost up to their standard.

It was the custom of certain eighteenth-century medallists to model the subject of the medal in lightly-tinted clay, from which a steel die could be executed, so that the medallian might be multiplied to any desired number. In this way terra-cotta medallions were made, and these are amongst some of the most interesting results of the artist-clayworker-engraver's work extant.



Medallion of Benjamin Franklin in Terra-Cotta.
By Jean-Baptiste Nini.

Jean-Baptiste Nini, a medallist of great merit, who was born at Urbino, in the Papal States, in 1717, and died at Chaumont, near Blois, was one of those who preferred this mode of working. The artist was employed by Le Ray, of Chaumont, to manage some glass and pottery works established at that place, and he seized the opportunity to make a number of excellent terra-cotta medallions, many of which are extremely rare. These were cast in metal moulds, and re-touched before baking, by the aid of sharp tools, with the result that the terra-cotta came out remarkably fine and sharp.

Le Ray counted amongst his friends the celebrated Benjamin Franklin and Nini, modelled the latter's profile in clay, and then cut a steel die for the purposes of multiplication. Nini signed his work and dated it 1777. In 1779, about 600 of these medallions, in terra-cottta, were shipped to America, but did not get so far. The ship was wrecked near the coast of Noirmontier, but a part of the cargo, amongst which were the medallions alluded to, found its way to Nantes. There it remained forgotten until the year 1830, or 51 years after shipment. Then, the boxes containing the medallions were opened, and the contents chiefly sold to a collector, whose collection has, at length, been dispersed. We have recently seen one of these terra-cottas, and it created quite an interest for us, as we had almost become accustomed to regard terra-cotta as a strictly non-artistic material in the modern æsthetic sense. This was apart from the romance of the particular medallion under discussion, which not only clothes that object with unusual interest, but opens up a much wider subject.

Nini's works are much sought after; as before stated, he was an artist of exceptional merit. But he had the acumen to perceive that subjects in terra-cotta could not be properly represented on a large scale. If modern artists in terra-cotta were contented, as he was, to use the material in miniature, and to take each clay casting as it came from the mould, and touch it with extreme care so that each piece should be as perfect as possible, modern critics could have little to say in disparagement of the material for artistic purposes. As it is, the best terra-cotta clay will shrink, and it, of course, shows the shrinkage most in large groups, where bold features tend to become distorted. We leave out of the question all reference to lack of uniformity of tint, so frequently conspicuous in large works, and we need not enlargé on the equestrian statue, all joints and make-ups —a triumph of the builder's skill. None of these criticisms, and many more which they convey, can be hurled at the modest medallion of a few inches in diameter, *cast*, it is true, but by an artist-clayworker, and *re-engraved in terra-cotta* by the same hand.

This medallion of Benjamin Franklin is truly a work of art, and shows what terra-cotta is capable of in the hands of a master well understanding both the merits and drawbacks of the material. It ought not to be forgotten, however, that Nini was exceptionally well placed to produce works of this kind. How many artistes of his calibre at the present day have the free run of the works in which their productions are burnt? Tinworth is a conspicuous example of a man of this stamp with similar facilities, and on an improved scale. Still, it may be doubted whether even he has really correctly interpreted the *raison d'être* of terra-cotta in a truly artistic sense. We like his works best when they are in low relief, and small. To make an elephant in terra-cotta is to court disaster and brings the material into ridicule. The same may be said for smaller groups in glass cases, especially where wire has to be employed for the reins of horses, and the like.

The plastic nature of clay is very tempting to the worker in high relief, and that may account for much of what we see; but if the latter were to follow artists like Nini in their conception of the true function of the material, more terra-cotta (from an artistic standpoint) would undoubtedly be employed, not only in this country, but in France and Italy—it would not be regarded merely as a "material of construction," though its uses in the latter connection will always be eagerly welcomed (but in a different sense) by artists and architects.

Nini's medallion of Franklin shows a profile bust of the *savant*, facing to the left of the observer; it is draped in Puritanical style, and, after the manner of many medallions of the period, has the head covered. We do not like the style of the cap, which is comparable with that worn by the modern

Russian peasant except that the uppermost rim is kept in position, and apparently tied by a short cord with close tassel.

At the same time, the likeness is a speaking one ; there is much more "life" in it than in any marble bust of the philosopher that we have ever seen. The features are most delicately chiselled in miniature, and altogether the work is a triumph of the medallists' and clayworkers' art. It is doubtful whether any of the numerous busts of Benjamin Franklin so faithfully convey what the man was like in life as this piece of work in terra-cotta. And, Nini has further enhanced the artistic merit of the medallion by the simple legend "B. FRANKLIN — AMERICAIN." There is no advertisement about that inscription.

INSTITUTE OF CLAYWORKERS.

TWENTY NEW MEMBERS.

A Meeting of the Committee was held at the Offices of the Institute on November 24th, Mr. Clement B. Broad (Paddington) in the Chair. There were also present Messrs. Edgar Webster, President (West Bromwich), Cafferata (Newark), Cunliffe (Kettering), Collier (Reading), Cunnell (Norwich), Gentry (Hedingham), Smith Harvey (London), F. Jewson, J.P. (Erith), J. J. Robson (Rochester), Arnold Statham, Standing Counsel, Mr. Stephen Bird, Solicitor, and Mr. H. Greville Montgomery, Hon. Sec.

The following new members, being duly proposed and seconded, were elected members :—

Batchelor, R. D., Chatham.
Brooke, H., Sheffield.
Durrow Brick & Tile Works, Ltd., Dublin.
Featherby, H. G., Bishops Stortford.
Fisher, J. W., Wellingboro'.
Golby, Thos. G., Coventry.
Harrison, W. T., Burton-on-Trent.
Herratt, Jno., Burton-on-Trent.
Loring Nele, Stoke-on-Trent.
Mason, W. J., Folkestone.
Middlehurst, T., St. Helens, Lancs.
Nicholls, H. F. W., Coventry.
Parks, Horris, Norwood.
Robinson, Fred., Russia.
Slater, J., Wood Green, N. London.
Towse, H. W., London.
Tunbridge, T., Folkestone.
Wescombe, W. J., Rushden.
Withnell Brick and Terra-Cotta Co., Ltd., Lancs.
Wynne, A. H., F.S.I., Drogheda.

Among other business,

AN ENGLISH TRIP

for next Summer was suggested by Mr. Montgomery. He stated that he had already received promises from various members to entertain the Institute in different parts of the country if they felt disposed. The works it was proposed to visit would include the following branches of the industry :—Fletton bricks (Peterboro'), Reds (Leicester), Glazed bricks (not yet arranged), Blue bricks (West Bromwich), and perhaps the Potteries, so that a thoroughly representative field might be covered.

SPECIFICATIONS ACCEPTED.

22,279.	(1898).	F. G. Maardt, Copenhagen. Improvements in Continuous Kilns.
24,294.	(1898).	R. Bennett. Improvements in Manufacture of Bricks, etc.
16,633.	(1898).	J. J. Mc Clelland. Improved Sand-Moulding Machine.
24,378.	(1898).	E. W. Engels. Manufacture of Fire and Acid-Proof Bricks.
24,188.	(1898).	M. Villaret and J. B. Walden. Means for Transporting Bricks.
172.	(1899).	T. C. Fawcett. Improved Press for Sand-faced Bricks.
19,607.	(1899).	F. Savery. An Improved Facing Brick.

APPLICATIONS FOR PATENTS.

November & December, 1899.

23,112.	A. W. Squires. Improvements in Garden Tiles.
23,273.	J. Middleton. Improvements in Glass Tiles.
21,726.	Jas. Marshall. Improvements in Bricks for Building Flat Arches.
21,946.	F. K. Cheese. Improvements in Glass Tiles.
23,689.	L. Nefkens. Improvements in drying Roofing Tiles, Bricks, &c.
23,774.	Jos. Place & Sons, Ltd., and W. H. Place. Improved Chequer Brick for Kiln Bottoms.
23,823.	J. T. South. Improvements in Building and Facing Bricks for Ornamental and Structural purposes.

THE WORKMEN'S COMPENSATION ACT, 1897.

THE LOSS OF FOUR FINGERS.

ONE WAY OF MEETING COMPENSATION.

John Edward Clarke, of Spondon Hill, Sherwood, a youth, claimed through his father compensation from the Nottingham Patent Brick Company for the loss of four fingers whilst in their employ. Mr. W. B. Smith appeared for the plaintiff, and Mr. Oliver (Wells and Hind) represented the defendant company. Mr. Smith explained the circumstances under which Clarke lost his fingers, whilst engaged as a "taker-off," at one of the company's machines. Mr. Oliver said his clients were quite willing to take the youth back again into their employment at his usual wages, and if he behaved himself, and did what work was given him to do, they would raise his wages at the end of a year. They would take him on at once at 8s. per week, but if he did not attend to his work they would deduct 2d. per hour. His Honour remarked that defendants were treating plaintiff extremely well, and he consented to the agreement suggested.

A FRACTURED SKULL.

A lad, named William Hy. Bird, aged fifteen years, of Stairfoot, has been killed at the Stairfoot Brickworks, near Barnsley, belonging to Mr. R. H. Micklewait. Deceased was working as usual in the capacity of feeder of a grinding machine. About a quarter to eight o'clock the engine driver told him he would stop the engine at the breakfast hour, and would then assist him to grease the cogwheels. The engine was accordingly stopped, but, without warning deceased, it appeared to have been just moved again to enable Kaye to place a bucket on the elevating machine. A labourer went into the works, and found deceased laid at the top of a large cogwheel of the machine with his skull fractured. The lad died a few minutes later.

THE LAW.

An Engine Dispute.—The record was closed and proof ordered by Lord Low in an action at the Court of Session by Robey & Co., Limited, engineers, Lincoln, against John G. Stein and Company, fire-clay works, Bonnybridge, Stirling, for payment of £955 7s. 7d., the sum said to be due by the defenders to the pursuers in connection with an engine supplied by the latter to the former at Bonnybridge. The defenders state that the pursuers made certain guarantees as to the fuel consumption by their engine, and that they failed to perform their obligations, and the amount of damage they have sustained is at least equal to the sum sued for.

The Truck Act—Absenting oneself from Work.—At Bakewell Petty Sessions before Mr. William Fenton and other magistrates, James Howe, a quarryman, of Tideswell, was charged with wrongfully absenting himself from work on the 15th and 16th of September, from the Buxton Lime Works Company, Limited. Mr. Sydney Taylor prosecuted. On entering the service of the company about five years ago defendant signed a written agreement whereby he agreed to work the year through without absenting himself, except by permission, accident, or illness. If he did so a fine or penalty was to be imposed for each day he was absent without leave. On Sept. 13th last year the defendant asked permission to go away on the 14th. It was the feast or something of the kind at Tideswell. He secured permission for that day, which was on a Thursday. He also remained absent on the 15th and 16th, and his employer now sought to recover the penalty. Mr. Neal, of Sheffield, who appeared for the defence, took exception to the summons under the provisions of the Truck Act, 1896, section 1 and 2, laying particular stress on section B, sub-section 2, and sub-section 1, of that Act, and he argued that in the first place the plaintiffs as employers put up a notice to the effect that they would enforce such a fine or penalty. This had not been done. Mr. Neal also raised other technical points under the Truck Act. The case was dismissed on legal points. Mr. Taylor said he would consider whether he would ask for a case.

Leaving Employment without Notice.—Charles Spokes, carter, was summoned by Messrs. Poulton & Son, brick manufacturers, of Reading, for leaving their service without giving proper notice, and the prosecutors claimed the sum of 18s., a week's wages. Defendant said there was no agreement. Samuel James Bright, foreman to Messrs. Poulton & Son, said he had been connected with the brick-making business for upwards of thirty years. Witness engaged the defendant about two years ago as carter, at 17s. per week. When he left he was receiving 18s. per week. Defendant was paid on November 11th, but did not again put in an appearance. In consequence of defendant leaving without notice the horse was idle two days. The practice of the trade was to give or take a week's notice. Cross-examined: witness admitted that the horse might have been at work on the Tuesday, and therefore it was only idle one day. Mr. George Collier, of the firm of Messrs. S. and E. Collier, said the custom with their firm was to give a week or receive a week's notice. George Malpas, time-keeper at Messrs. Poulton & Son, corroborated. Defendant said he knew for certain that the horse was at work on the Monday. Furthermore, his week ended on the Friday, and he was at work on the Saturday and Sunday. Alfred Young, another carter in the employ of Messrs. Poulton & Son, was likewise summoned, and a claim of 18s. was made. Defendant admitted working on the Saturday and Sunday. Samuel James Bright said the man had been in Messrs. Poulton's employ for six months. He received 18s. a week. Defendant's horse was not at work all the ensuing week. Both defendants were ordered to pay 5s. and 8s. costs.

The Smoke Nuisance—A Judge judges from Experience.—A case turning upon the question of damage from smoke from kilns was recently heard before Judge Masterman, the plaintiff being Mr. Wm. Arthur of Barlboro', and the defendant Mr. Peter Newton of Derby. The claim was £50 damages and an injunction restraining the defendant from continuing the nuisance. His honour said that after the last Court he went and viewed the premises, and he was very glad he did, because he discovered that the case had been greatly exaggerated by the plaintiff's witnesses. He thought this was so when he heard the case, but when he went over he found it was an entirely different class of property from what he had been led to believe. Some damage had certainly been done. Two small chestnut trees had been practically destroyed by the kiln, which the defendant in the witness box said he would remove. A little damage was done to some trees in the orchard and garden, but it was very little, and some of the trees in the orchard were very old and must have been worn out long before the plaintiff became possessed of the premises. The damage to the hedge, of which considerable complaint was made, he estimated at nothing at all, and, as far as he could judge, there was no reason to doubt that the hedge would break out in the spring and be as good as ever. The damage to the pasture also seemed to have been small. He therefore found for the plaintiff for £3 on the chestnut tree, £1 10s. on the fruit trees, and 10s. on the pasturage, making in all £5, with costs on that amount. With regard to the injunction, he very much doubted whether this was the sort of case in which an injunction could ever be granted, but he had made up his mind to give the defendant an opportunity of seeing what the amendment he promised in removing the kilns would do. He therefore proposed to adjourn the application as to the injuncion without fixing any date giving either party leave to apply at any time they chose.

Manorial Rights and Brickmaking. — Before Mr. Justice Phillimore, at Manchester, on November 14th, the hearing of the action brought by the Claughton Manor Brick Co. Limited and Edmondson, against the Lunesdale District Brick and Tile Co. Limited was concluded. Mr. Pickford, Q.C., and Mr. Overend Evans appeared for the plaintiffs, and Mr. Shee, Q.C., and Mr. Horridge for the defendants. Plaintiffs alleged in the statement of claim that the Lunesdale District Brick and Tile Co. Limited had between May 14th, 1897, and November 15th, 1898, entered a close of the plaintiff Edmondson, and taken away shale and clay, and between November 15th, 1898, and April 12th, 1899, similarly broken into a close belonging to the plaintiff company. The plaintiff company claimed to have been in possession of the close since November 15th, 1898, and that they were now in possession of the close as lessees. The claim of the plaintiffs was for money received by the defendants, and for an account or alternately for damages. The company also asked for an injunction restraining defendants from a repetition of the acts complained of. Defendants denied the trespass, submitted that if there were a claim it was barred by the Real Property Limitation Act, and urged that any claim was barred by the acquiescence of plaintiffs or their predecessors. The questions to be decided was whether plaintiffs were entitled to manorial rights, whether these included mines and minerals, and whether clay and shale come under the description of mines and minerals. At the rising of the court on Monday Mr. Shee had not concluded his address to the jury.—On taking his seat next day, his Lordship suggested to Mr. Shee that while there was a deal more to be said on behalf of his clients, it might be well, considering the enormous difficulties in the way, to see if he could not agree with his adversaries.—Mr. Shee said that the points hinted at by the Judge had been considered, and he was afraid the parties could not come to terms.—After a consultation lasting half-an-hour with plaintiffs' counsel Mr. Shee said he was very sorry that the terms suggested were such as could not be agreed upon.—His Lordship: Is it possible that I can help you?—Mr. Shee: I don't think it is. Personally we should be very glad, but this is a trade dispute, and it is very difficult.—Addressing the jury, Mr. Shee said that in these circumstances it would be for them to find a solution of the difficulty one way or the other.—The Judge: You are very unwise, Mr. Shee, if you do not take what terms you can get.—Mr. Pickford said the terms mutually suggested were such as they could not advise.—Mr. Shee proceeded to address the jury. He was sure, he said, they would not be influenced by what had just passed between His Lordship and counsel engaged in the case.—Evidence was then called for the defence.—His Lordship, after hearing the legal argument, ruled that there was no question for the jury, and directed that a verdict be entered for the plaintiff Edmondson for 40s. He gave judgment accordingly, and granted an injunction restraining the defendants from working beyond the limit of the present workings. He decided that clay and shale were minerals.

Alleged Threatening Letters to a Brickmaker.—At the Devon Assize, Thomas Laskey, 48, described as a farmer, was indicted for sending a letter to John Sampson, a brick manufacturer of Heavitree, Exeter, demanding of him £300 in money, with menaces, without reasonable and probable cause, on the 23rd May.—Mr. Percival Clarke appeared to prosecute, and Mr. Bodilly defended.—In opening the case Mr. Clarke said some time ago the prisoner owned certain property in Moretonhampstead, but he got into financial difficulties which caused him to mortgage it, and the mortgages foreclosed. The property was about to be offered at auction, and as prisoner did not want to lose it he went to Mr. Sampson, whom he had known for several years, and who at his request bought the property, giving £1,000 for it. Prisoner said he would raise the money among his friends and buy it back from Mr. Sampson, but this had never been done. On the 23rd May of this year Mr. Sampson received a letter purporting to come from the "head-quarters of the Socialistic Commune, London," and setting forth that Laskey's affairs had been considered by the Commune and their decision was that Mr. Sampson should pay to Laskey, at Haytor View, Moretonhampstead, £300 in Bank of England notes, with the understanding that Laskey should leave the country within three months and not further molest him. Unless he did so he must prepare to meet his doom, as he and his agent Loveys would be removed. They could not escape as the organisation of the Commune was ample and their agents were the world over. If on the other hand Laskey failed to carry out his part they would remove him and protect Mr. Sampson. The letter was signed, "Alpha, Chairman and Secretary." The question to be decided by the jury was—Did the prisoner write that letter?—His Lordship summed up, and after brief deliberation the jury found a verdict of "not guilty," and prisoner was discharged.

Claim by Brick-Machine Engineers.—Johnson & Sons *v.* New Malden Potteries and Brickworks, Limited.—Mr. Manisty appeared for the plaintiffs, Messrs. Johnson & Sons, Armley, and Mr. Tindal Atkinson, Q.C., and Mr. Norman Craig represented the defendants, the New Malden Potteries and Brickworks, Limited. On the application of counsel on both sides, his Lordship agreed to dispense with the special jury, which had been certified, and to try the action himself. The plaintiffs claimed £413 16s, 9d., partly in respect of the price of a brickmaking machine supplied and partly for work and labour and professional services rendered. There was a counter-claim by the defendants for damages for the non-performance of a contract, by which, it was alleged, the plaintiffs agreed to supply a machine which would turn out 4,000 bricks per hour. The case occupied a considerable length of time on Monday and Tuesday last, and eventually judgment was reserved.

COMPANIES' MEETINGS.

Knock Brickworks, Ltd.—At an extraordinary general meeting of the above-named company, held at 29, Rosemary Street, Belfast, on the 19th October, it was decided that the company be voluntarily wound up. Mr. Arthur Affleck, 29, Rosemary Street, Belfast, was appointed liquidator.

Castleford Healdfield Brick Co., Ltd.—The annual meeting of the shareholders was held on the 7th instant. Mr. Barron Kilner (Mayor of Wakefield), chairman of the board of directors, presided. A dividend on the past half-year at the rate of 15 per cent. per annum, was declared.

Woodside Brick Co., Ltd., Sheffield.—The first annual ordinary general meeting of the above company was held at the Cutlers' Hall, Sheffield, on Nov. 23rd. Mr. Alfred J. Forsdike, chairman of the Company, presided, and was supported by Messrs Edward Dickinson, George Williams, and Frank Osborne (directors). There was a numerous attendance of shareholders. The directors' report and accounts as issued to the shareholders were approved and adopted. The chairman alluded to the company having been manufacturing bricks for some six months past, and with the additional machinery that was in course of erection he expected the output of the Company to be considerably increased within a very short period. Mr. A. J. Forsdike was re-elected a director, and Mr. W. Hubert Smith was re-elected auditor. A vote of thanks to the chairman and directors concluded the business of the meeting.

The Fishponds and Bedminster Brick and Tile Co., Ltd.—The sixth ordinary general meeting of the shareholders of this company was held at the Royal Hotel, College Green, Bristol, on Monday, the 13th ult. The profit and loss account for the year ended 30th September last, together with the balance sheet at the said date, as prepared by the auditors, Messrs. Hudson Smith, Briggs & Co., having been in the hands of the shareholders for the statutory period of seven days, were taken as read. The Directors in their report expressed regret that in consequence of the exceptionally heavy rainfall of last winter, and of consequently increased cost of production, the profits of the past year fell considerably below those of 1897-98. They recommended, after setting aside six per cent. on the preference share capital, accrued to 30th September, to pay a dividend of three per cent., free of income tax, on the ordinary share capital of the company, and, subject to the payment of directors' fees, to carry forward the balance to next year's account. In moving the adoption of the report, the chairman, Mr. John Thomson, showed that the extremely adverse weather experienced had increased the wages, as compared with the total sales, three per cent., and that the expenditure for coal, partly for the same reason, and partly from its higher price, had risen to the extent of four per cent. Nevertheless, a large sum had been judiciously expended in extending and improving the machinery, plant, etc., which were in a better condition than at any time in the history of the company. Their goods had been and were in good demand, and notwithstanding the unsatisfactory result of the past year's trading, he looked forward, with confidence, to a better state of things during the year upon which they had now entered. The accounts and report were unanimously approved and adopted. The managing director, in endorsing the view expressed by the chairman, called attention to the fact that some of the company's assets, and particularly the land held by them, did not appear in the balance sheet at their true value, and suggested that in future balance sheets the ascertained values should take the place of those shown at present, so that the accounts might, so far as practicable, exhibit a fair and trustworthy statement of the actual position of the company, which he contended was much better than now appeared, good as that was. Mr. Charles E. Hagon, of Bridgwater, the retiring director, was unanimously re-elected. Several hearty complimentary resolutions brought the meeting to an agreeable close.

NEW COMPANIES.

The Milton Brick Works Company, 112, Bath Street, Glasgow, to carry on the business of brick-making in the neighbourhood of Glasgow. Capital £4,000, in 4,000 shares of £1 each.

Forest Brick and Tile Co., Ltd.—Capital £15,000 in £1 shares. To carry on the business of brickmakers, merchants and manufacturers of and dealers in iron, brick-earth, gravel, clay, coal, etc. Table A mainly applies.

Woolpit Brick Co., Ltd.—Capital £80,000 in £1 shares. To acquire the Woolpit Estate, Suffolk, and also the business carried on under the style of the Woolpit Brick Works Co., Ltd. The first directors (of whom there shall not be less than three nor more than five) are to be elected by the signatories. Qualification, £250; remuneration. £100 per annum each (chairman, £200).

Glan-Garnant Colliery Co., Ltd.—Capital £10,000 in £5 shares. To carry on the business of colliery proprietors, brickmakers, and dealers in mineral substances. The number of directors is not to be less than two nor more than seven. The first are to be appointed by the subscribers. Qualification £500; remuneration as fixed by the company. Registered office, 16, St. John's Square, Cardiff.

C. O. Fison, Limited.—Capital £10,000 in £10 shares. To acquire the business carried on at Stowmarket, Suffolk, as brick, tile and pottery manufacturers, quarrymen, &c. The first directors —to number not less than three nor more than five—are S. T. Harwood, W. C. Prentice, and S. Prentice. Qualification, £10. Remuneration as fixed by the company. Registered office: Stowmarket.

Buttington Brick, Tile, and Terra-cotta Works, Limited.—Capital £10,000 in £1 shares. To acquire the business carried on by H. H. Treasure, at Buttington, Montgomery, and to manufacture and deal in bricks, tiles, pipes, pottery, etc. The number of directors is not to be less than three nor more than seven; the subscribers are to appoint the first. Qualification 100 shares. Remuneration as fixed by the company.

Dove Holes Brick Co., Ltd.—Capital £8,000, in £10 shares. To adopt three agreements (1) with John S. Marchington; (2) with Samuel Marchington, and (3) with Samuel Marchington and John S. Marchington; and to carry on the business of brick, tile, pipe and pottery manufacturers, contractors, etc. The first directors to number not less than three nor more than five are: C. S. Smilter, J. E. Sutton and R. Leah. Qualification, £200. Remuneration, one guinea each per board meeting attended. Registered office, 3, Ash Street, Buxton, Derby.

H. B. Whitehouse & Son.—Capital £15,000 in £10 shares, to acquire the business carried on at Priorfield Furnaces, Coseley, and elsewhere, under the style of H. B. Whitehouse & Son, and Whitehouse Brothers, to adopt an agreement with Benjamin Whitehouse, Robert Muras, and Walter Jenks, and to carry on the business of colliery proprietors, fire-brick manufacturers, etc. The number of directors is not to be less than two nor more than seven. The first are Benjamin Whitehouse (chairman), Robert Muras, and Walter Jenks. The latter is the nominee of Isaac and William J. Jenks, who may appoint one director so long as any moneys remain owing in respect of a loan of £7,500 by them. Qualification, £500; remuneration as fixed by the company.

TRADE NOTES.

An International Congress on the inspection and security of steam boilers is to be held in connection with the Paris Exhibition. It will begin on July 16th, 1900, and extend over three days.

Fire-bricks for Japan.—Messrs. Lowood & Co., of Sheffield, have at present on hand two important orders for the supply of ganister and fire-clay bricks for Japan. One of these is of the value of £5,000, and the material is to be used in connection with the new steelworks on which the Japanese are now engaged.

Tenders are invited for the purchase of Talyclyn Colliery and Firebrick Work, Pontardulais, as a going concern, with all buildings, plant, machinery, and materials, comprising a slant about 300 yards long in the "Golden Vein," a Lancashire boiler, winding engine, steam pump, three circular kilns, large stove, pug mill, grinding pan, Johnson's combined brickmaking and pressing machine, driven by an 18-inch horizontal engine.

Big Driving-Wheel Smash.—At Kettering, on the 7th instant, the large driving-wheel at the brickworks, whilst in motion, suddenly broke, and the heavy masses of steel crashed through the floor and broke down the adjoining walls. One man was struck on the head with a piece of flying masonry, and two pieces of steel weighing 4 cwt. dropped on either side of another man. It was also found that these pieces were embedded in the ground to a depth of 3 feet. Coniderable damage was done to other plant and buildings.

The Fire Prevention Committee and the Paris Exhibition.—The British Fire Prevention Committee announce that they have withdrawn their proposed collective exhibit for the Paris Exhibition, as they, and the forty-five firms manufacturing fire-proofing material who would have been concerned in the exhibit, consider that the state of affairs in France at present is not opportune for such an exhibition of English work. The committee have also withdrawn the special scientific exhibits which they had themselves proposed.

A Breakwater formed of Natural Cement at Marquette (America) has proved a great success, and it is calculated that it will be in good serviceable condition a hundred years hence. Twelve years is the average life of the old wooden-cribbed breakwater filled in with stone. When the work was begun seven years ago, many engineers doubted if the natural cement could be used in place of Portland, but experience has proved that, mixed with a small quantity of the latter, it is admirable, so much so, in fact, that the Government has undertaken a much larger work of the same kind at Duluth.

The Sutcliffe Ventilating and Drying Co., of Manchester, inform us that they have never been so busy as they are at present in supplying brick-drying plants. Amongst the many firms for whom Messrs. Sutcliffe's are putting down their trolley plants we may mention Messrs. W. Higgins & Sons, Cheetham, Manchester; E. Brook & Sons (Leeds Fireclay Co., Ltd.), Huddersfield; Atlas Brick and Tile Co., Ltd., Willesden; Owen Thomas, Rhosgoch, Anglesey; Mill Lane Brick and Tile Co., Bradbury; J. Worthington, Morecambe; Gem Brick and Tile Co., Ltd., Chester; and they have recently shipped a large drying plant to Cape town. Messrs. Sutcliffe & Co. also point out to us that in our article in last month's issue on "Mechanical Draught in Brickyards," we inferred that only one firm had successfully used the heat from kilns for assisting the drying, whereas they installed a Drying Plant for Messrs. C. J. Saunders & Co., Ltd., Chesterfield, some time ago, where the waste heat from down-draught kilns is used with great success.

Death of a Cardiff Brickmaker.—We regret to announce the death of Mr. W. R. Copp, 57, Richands-terrace, Cardiff, which occurred on December 7th at his residence, after an illness which came with painful suddenness last January in the form of a paralytic seizure, and from which he never rallied. He made his home in Cardiff over 30 years ago, coming over from Bideford to undertake a brick and pottery business at Roath. A staunch Liberal and an active party worker, his death creates a gap in the Liberal party at Roath which it will be hard to fill. He served on the Central Executive for many years, he was a member of the old association, and he was at the time of his death president both of the Ward Committee and the Roath Liberal Institute.

Death of a Singapore Brickmaker.—We regret to record the death of Mr. James Cumming, of the firm of Messrs. Fraser & Cumming, brickmakers, who expired under painful circumstances, on October 26th. Mr. Cumming, together with a Mr. Maclaren, was bathing in the sea near the former's bungalow at Beting Kusa about mid-day. Mr. Maclaren, noticing that Mr. Cumming appeared to be in difficulties, went to his assistance, and brought him out of the water. Further assistance was forthcoming but Mr. Cumming never rallied, and expired before medical aid could be obtained. The medical examination subsequently showed that death was due to syncope. Mr. Cumming, who came to Singapore from Jedburgh, Scotland, had resided in the Colony for a number of years.

We understand that the Saxon Portland Cement Company, Ltd., whose large works are now being erected on the Cambridge-Newmarket line, have placed an order in the town for all the chemicals, acids, &c., for use in their new laboratory, and previous to the arrival of their staff of chemists. This is quite a new departure in the Cambridgeshire cement manufacture, and it is said that the new company are putting down the most modern and efficient plant, by the adoption of which Cambridge and its surroundings may be made the centre of an enormous cement making industry—the quality of material produced by their new machinery (which, by the way, is being supplied by Messrs. Krupp's) being absolutely the best cement obtainable. Obviously Messrs. Keeble Bros. (the enterprising brickmakers, of Peterborough) will do for Cambridge in cement what they have already done for Peterborough in bricks, and the managing director of the company (Mr. A. C. Davis) has for some time made the marl of Cambridgeshire the especial object of an indefatigable study.—*Cambridge Daily News.*

Trade in the Potteries.—The china and earthenware trades are brisk, and new orders are coming in with gratifying regularity. Manufacturers, however, complain that the cost of raw materials is increasing without any increase in selling prices. There is no indication of any combined effort to increase selling prices, nothing being heard of the "Alliance" which formed the subject of so much discussion a few months ago. The improvement in American trade is being maintained. It is reported that buyers from the United States who have been in the district have given out more orders than is usual at this time of the year, and in some instances have asked for a time stipulation for delivery. The export trade is somewhat hampered by the withdrawal of vessels from the Mersey for war purposes, so that there is a slight decline in the total number of shipments as compared with the same period last year. There is a growing demand for goods of an all-round character for the Australian market. Trade with other colonial markets continues to improve; and in South America a steady business is being done, but not to the extent that obtained a few weeks ago. In the home market the activity of the last few weeks is being maintained. The demand is a general one, and the electrical-fittings department is rapidly returning to its old state of prosperity.

Smells from Macadam Roadways.—Dr. Wynter Blyth, the Medical Officer for Marylebone, in the last issue of the "Sanitary Chronicles of Marylebone" has the following remarks under the heading "The Seymour Street Stink":—"The residents in Seymour Street and a few other neighbouring streets were recently much annoyed by an offensive smell. The particular smell in question is an old acquaintance of the writer's. It can always be detected in the Park Road after a spell of dry weather, and without doubt emanates from the macadam road when fouled with horse-droppings. The conditions producing it are:—(1) A macadam road; (2) Much traffic and therefore much horse droppings; (3) A spell of dry weather, and especially warm dry weather. It is a peculiar sickening odour, well calculated to disturb the minds and digestive organs of those who are obliged to inhale it. The remedy seems to be a very thorough scavenging of streets or roads in which the ferment producing the odour exists. Heavy showers of rain invariably destroy it. After the recent heavy rains the writer has been unable to detect the odour." This is another point in favour of brick-paving.

Architecture in London.—Mr. William Emerson, the president of the Royal Institute of British Architects, referred recently to the ugliness of certain parts of London, and this has prompted a correspondent of the "Pall Mall Gazette" to state that Paris, as we see it, is universally admitted to be a model of what a city should be. Though London cannot now hope to rival its French neighbour, it possesses a degree of picturesqueness and a restrained and dignified beauty which some painters, notably Whistler, have been quick to recognise, in spite of the fact that Ruskin himself compared the architecture of Gower Street with that of the Grand Canal of Venice, to the obvious disadvantage of the former. The object of the correspondent's remarks is to draw attention to a huge building at Knightsbridge, built of stone and brick, which rises on a substructure entirely composed (to all appearance) of sheets of plate glass; the girders are concealed. Though a great expanse of shop front is often demanded, it should surely be curtailed by the most elementary architectural and artistic demands, which in this particular case, seem to have been ignored. The correspondent concludes thus: "The building, indeed, is secure, and may last for ever. So long as it does, it may serve as a gruesome warning to long-suffering Londoners not to allow the finest sites in their capital to be usurped by ill-designed and inadequate buildings."

Coming-of-Age Celebration.—On Monday evening, December 4th, a dinner was given at Dudley Road, Wolverhampton, to the workmen employed at the Phœnix Brickworks, Wolverhampton, by Councillor W. Shepherd, the occasion being the coming-of-age of his youngest son, Mr. Arthur Shepherd. The proceedings were of a very harmonious and interesting character throughout. The company numbered between 60 and 70. The chair was occupied by Councillor W. Shepherd. Afterwards Mr. E. Caddick (underworks manager) gave "Our Guest," and presented Mr. Arthur Shepherd with a massive gold double chain and pendant, which had been subscribed by the employés of his father.—Subsequently, a purse of gold was presented by the members of the family.—The recipient responded. Referring to the continued harmony which had always prevailed between the workmen and their employers, he said he trusted that that spirit would long continue.—Councillor Levi Johnson, J.P., proposed "Success to the Phœnix Brickworks," and spoke of the great strides and advancement which had been made in brickmaking by machinery, in which Councillor Shepherd was one of the first and largest in the district.—Mr. Fred W. Shepherd responded, and alluded to the great success which had attended the works from their commencement.

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Municipal Brickmaking at Glasgow.—At a recent meeting of the Special Sub-Committee of the Glasgow Gas Corporation on the Utilisation of Clay in the Lands of Eastern Blochairn, Mr. Foulis, the engineer in chief, submitted the plans and specifications which had been prepared by Mr. Rankine, C.E., for putting down the plant and erecting the buildings on the lands of Eastern Blochairn for the utilisation of the clay found therein in constructing the new Provan Gas-works. The Sub-Committee having considered the plans and specifications, approved thereof. Subsequently the Special Sub-Committee reported that they had arranged with Mr. Rankine as to the remuneration to be paid to him for the preparation of the plans and specifications, and superintending the putting down of the plant, and the erection of the buildings—the rate to be as entered in the agenda book of that date. The manager, at a subsequent meeting of the Works Sub-Committee, reported that it would be necessary to acquire from the adjoining Milton Estate an additional piece of ground, extending to 5·572 acres, for the construction of the new Provan Gas-works and the branch ways to be formed in connection therewith, and that the proprietor of the said estate was prepared to sell the ground (including the minerals) to the Glasgow Corporation, at the price of £750 per acre. The Sub-Committee, after giving the matter consideration, agreed to recommend that the additional ground referred to, be purchased by the Corporation at the price mentioned. It was remitted to the conveners of the Gas Committee and Sub-Committees thereof, along with Councillor Calderwood, to confer with a Sub-Committee of the Parks Committee as to the formation of road No. 1, adjoining the lands of Eastern Blochairn, authorised by the Glasgow Corporation (Gas and Water) Act, 1899, and to report. At a further meeting of the Sub-Committee on Works there were submitted the tenders which had been received for (1) the excavation and building of the new brickworks to be erected on the lands of Easter Blochairn for the utilisation of the clay found in these lands, and (2) providing and erecting the necessary plant and machinery in the works. The same having been opened and considered, it was agreed to accept (1) the offer by Messrs. Robert M'Alpine & Sons, brickbuilders, for the excavation and the building of the brickwork, if, upon being checked by the Measurers, it is found to be the lowest offer—the amount of the tender is £7,765 9s. 4d ; and (2) the offer by Messrs. Bradley & Craven, Limited, for the plant and machinery—it being the lowest offer, the amount of it being £2,128.

Brickmaking Enterprise at Newark.—There is now in course of erection on the Kelham Estate, an extensive group of buildings for the purpose of brickmaking on the most approved system. A tall chimney has been rearing its head within the past six or seven weeks, and can be distinctly seen from Debdale Hill. It is over 120 feet in height, and last week the workmen were putting the cap on it, practically finishing a very substantial piece of masonry. Few people passing along the Kelham Road in the direction of Southwell, are aware that just off the principal thoroughfare there is such an important commercial undertaking in progress of completion, where some thousands of pounds are about to be risked in a project that it will be generally hoped will result in success. The site of the new brick-yard may be found some distance down the lane leading past Kelham Hall gardens, over the hill to Caunton. Just on the slope a valuable stratum of clay has been discovered on the Kelham estate, and we believe the enterprise of working it will be directed by Mr. Sutton himself. The bed of clay is estimated at a forty-feet seam, and it is of excellent quality, according to the tests it has already been submitted to. The brick it will manufacture will be of a first-class colour, and it is expected that there will be a considerable demand. In six weeks the locality has been completely transformed, and a busy hive of workmen are now engaged with the kilns, engine-house, etc. It is satisfactory to know that a local firm of contractors has been entrusted with the order to build that part of the structure for the housing of the engine, boiler, and machinery, namely, Messrs. Trueman & Sons, Upton. The total frontage of these will be sixty-six feet, and the elevation shows sliding doors. A seventy horse-power engine will be put in and a Cornish boiler. The contract for the kilns and chimney has been taken by Messrs. W. and T. Roland, of Glasgow, whose foreman is Mr. James McNeill. The latter with three other operatives came about six weeks ago from Scotland, obtaining what other labour is required from this neighbourhood. The system of brick-burning that is being introduced is known as Hoffmann's, for which the firm has a patent. It has been in vogue about five years, and its special feature is that it saves a considerable amount of work in the drying process. From the time the clay is dug out of the bank to the time when it comes out of the kiln in bricks it is not touched by human hands, and this obviously must be a great advantage over the old method of brick-making. The machinery puts a pressure on each brick of as much as twenty tons. In the buildings now in course of erection there are twelve chambers, six on each side, and they are 18ft. by 15ft. The breadth of the kiln is 48ft. 6in., and the length 124ft. The height of the chimney is 127ft. 6in., and there are four feet of concrete; it is 18ft. in diameter at the base and 6ft. 2½in. at the top. As may be said of all the other workmanship, the boiler-house, engine-house, etc., built by Messrs. Trueman, appear to be on a scale that will admit of the introduction of some elaborate machinery ; the boiler house is 18ft. by 58ft., the machinery-house 24ft. by 58ft., and the engine-house 41ft. by 18ft. A great deal of excavation has been necessitated in obtaining the levels for the buildings owing to the formation of the hill. The plant will be of such a capacity that it will turn out no less than 13,000 bricks per day. The plans have been drawn by Messrs. Bever, Doring & Co., Dewsbury, and the machinery will be supplied by Messrs. Bradley & Craven, Wakefield ; but at present the kiln constructors, Messrs. W. and T. Roland, and the builders of the engine-house, etc., Messrs. Trueman & Sons, are busy with their parts of the contract. When this new enterprise is in full working order, there should be no dearth of bricks in this neighbourhood such as has sometimes been experienced. It may be hoped that with the new engineering firms in our midst, and the great influx of population expected, fresh impetus will be given to the building trade in this district.—*Newark Herald.*

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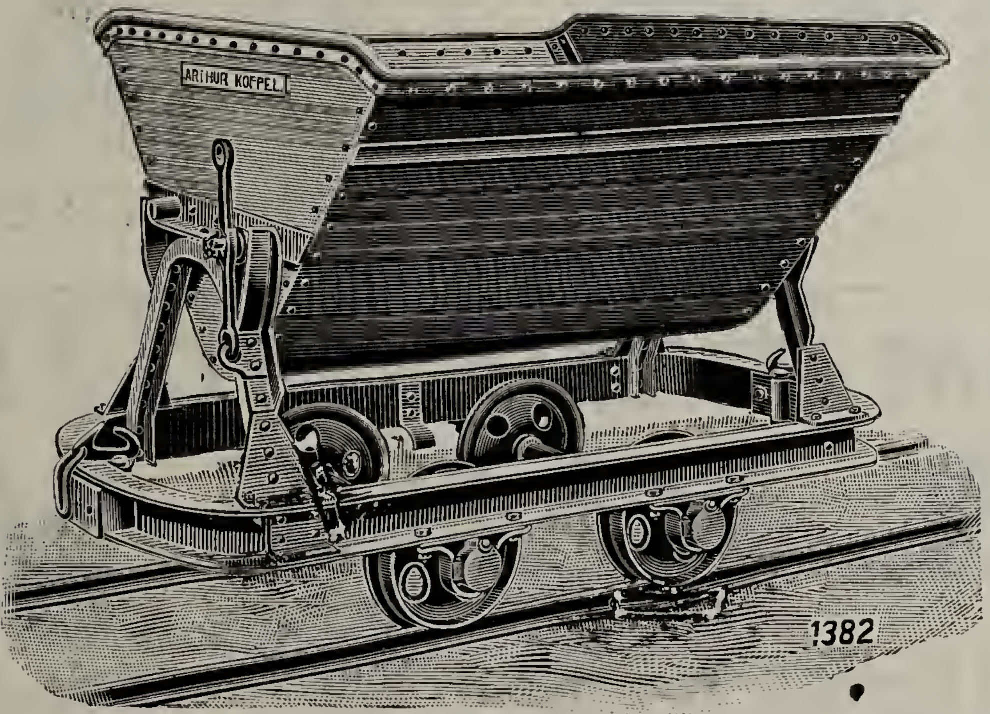

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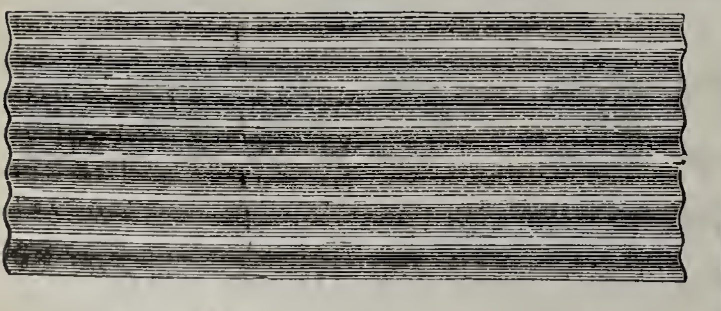

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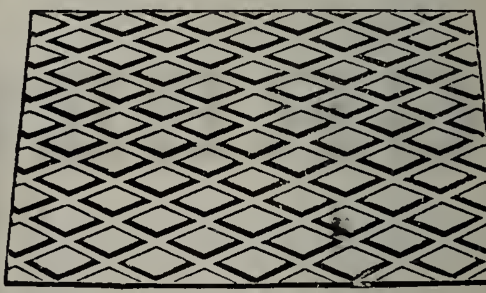

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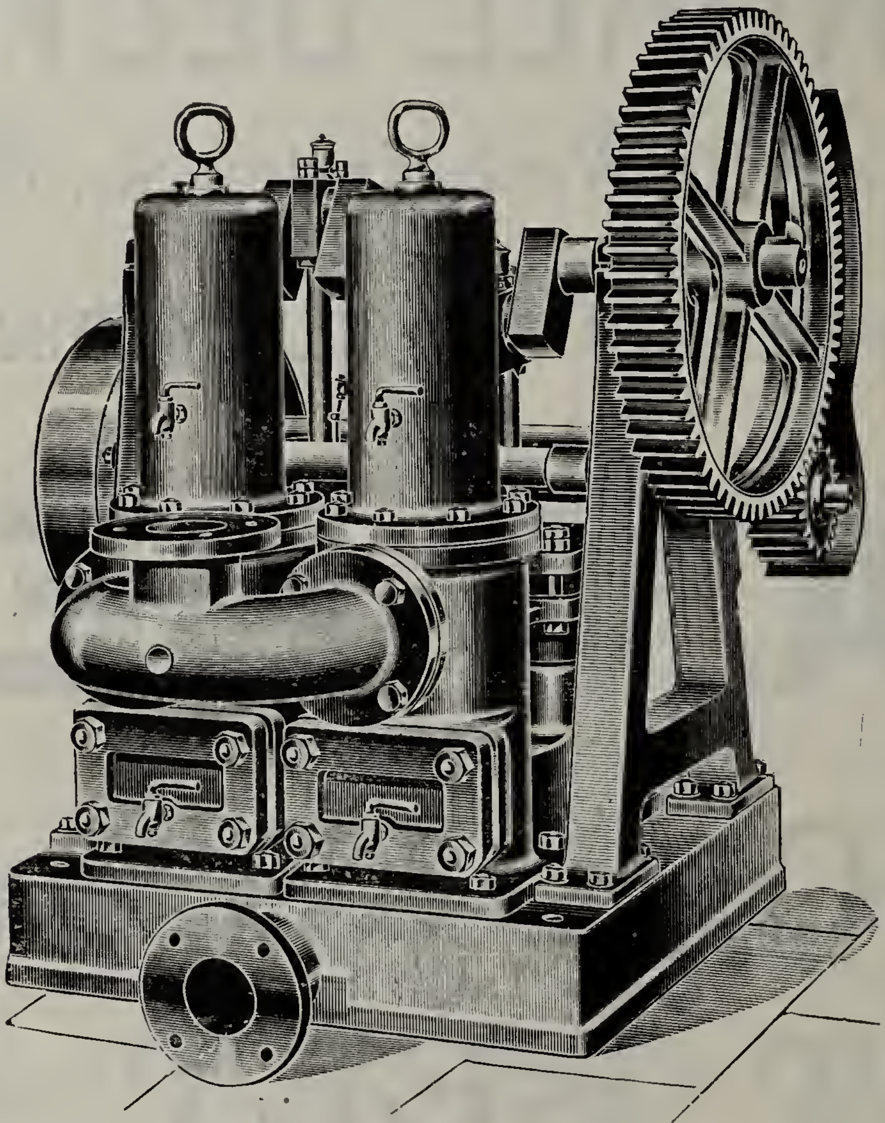

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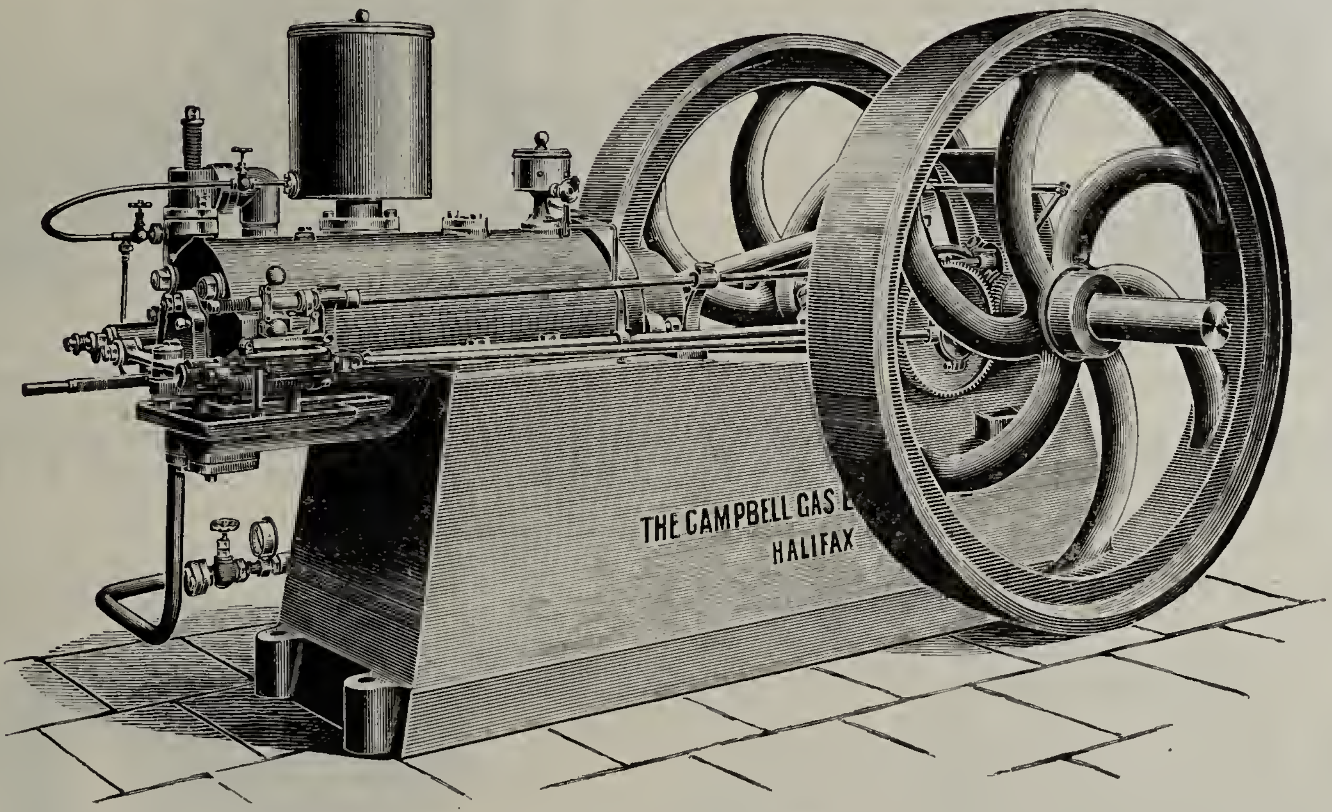

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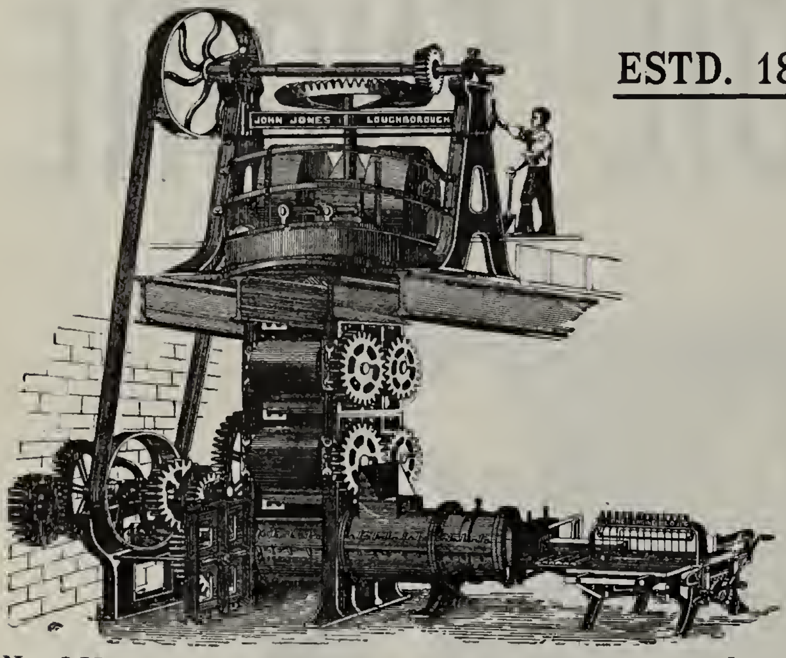

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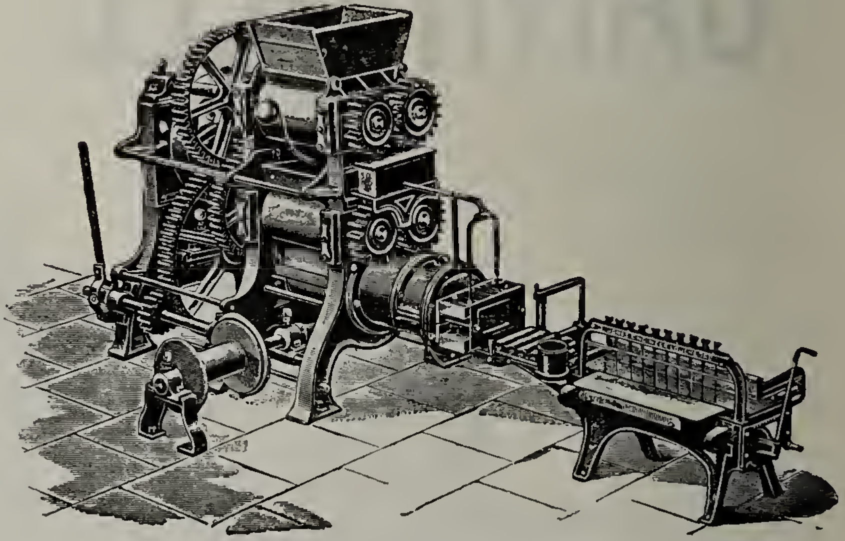

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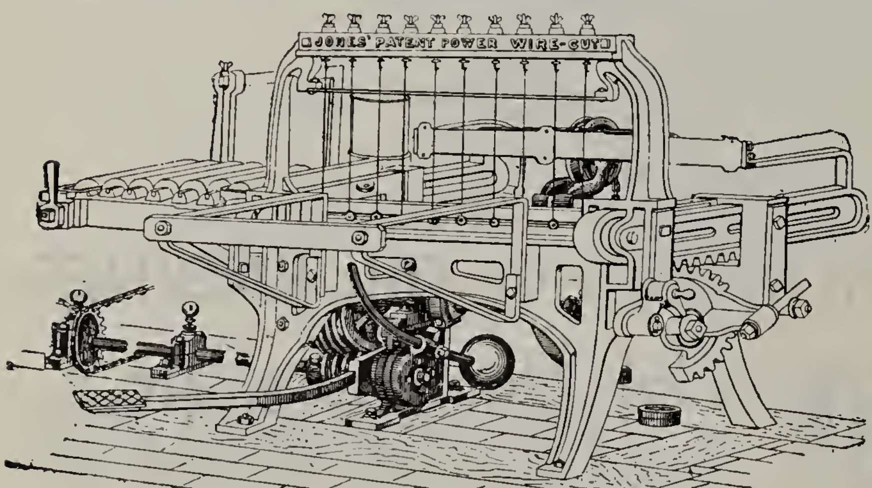

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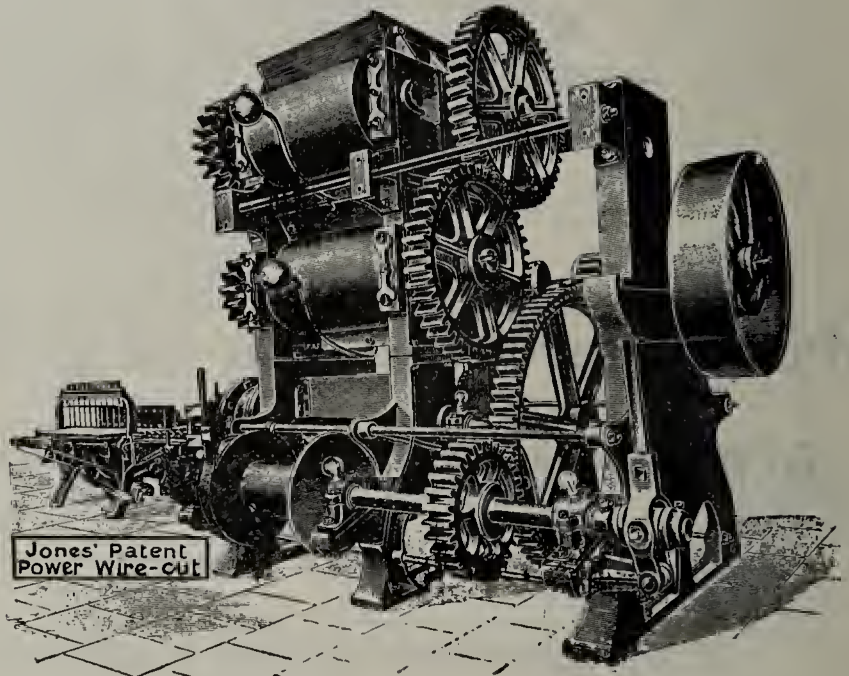

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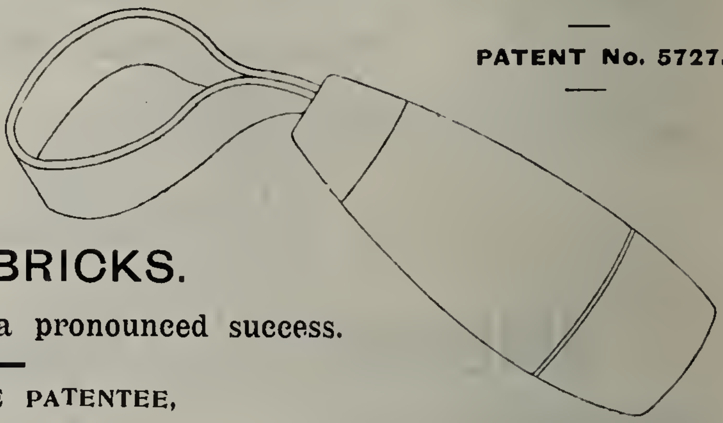

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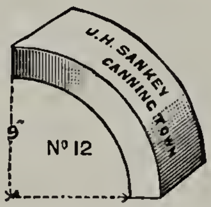

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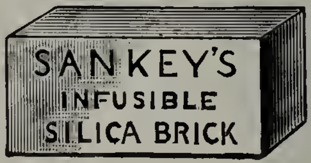

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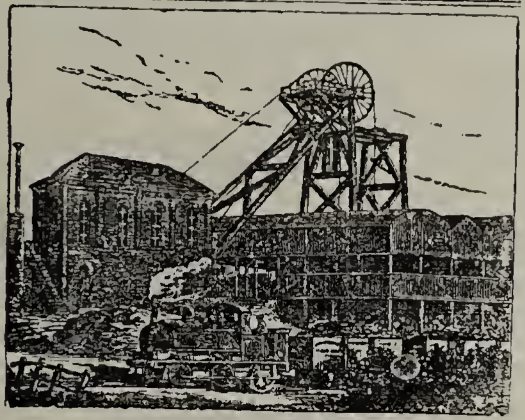

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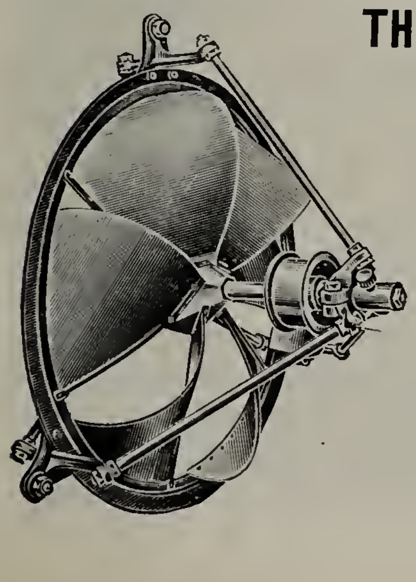

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December, 1899.

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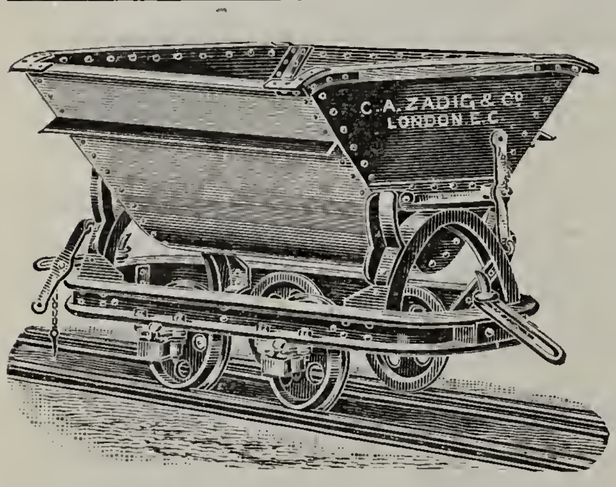

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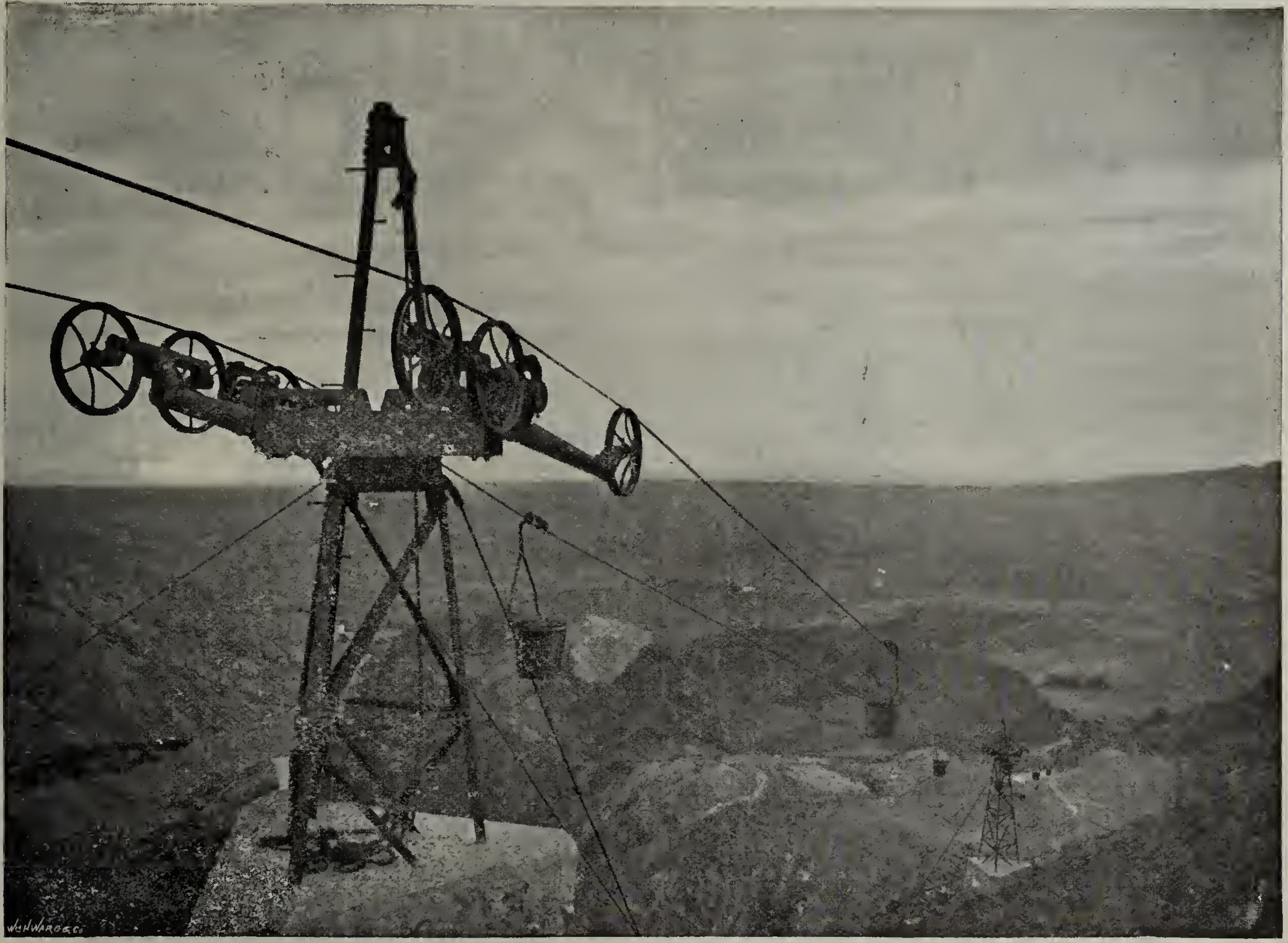

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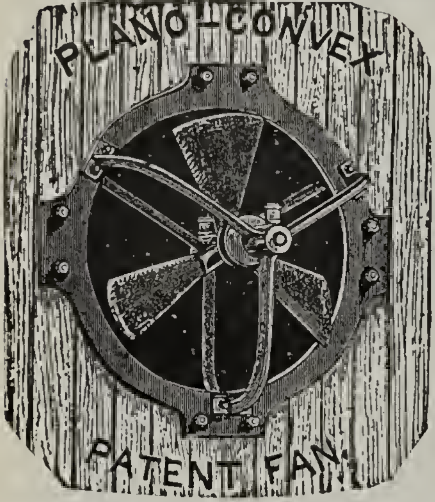

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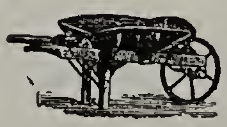

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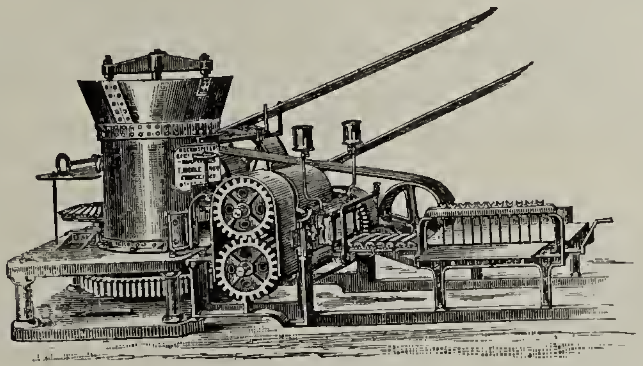

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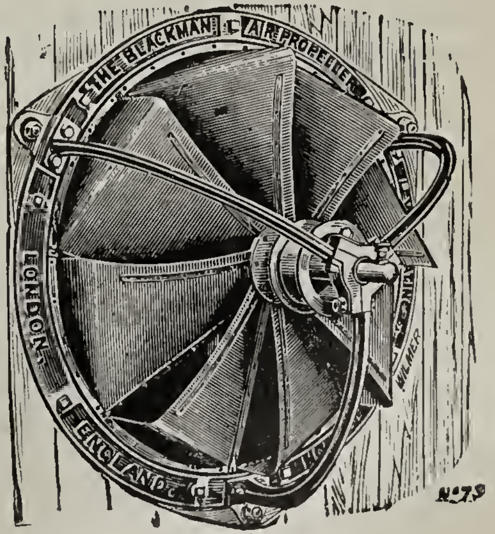

BY THE WAY.

THOSE clayworkers who were fortunate enough to enjoy the hospitality of Mr. Arthur Koppel during our recent visit to Berlin, will read with great interest the following remarks by the London correspondent of the *Daily Telegraph* in that city, an accomplished journalist who, it will be remembered, proposed the health of the Queen at our final dinner. His remarks *anent* the courtesy and enterprise of the German manufacturer will be the more appreciated in that we can socially, and from a business side, ourselves bear testimony to these qualities in one at least of Berlin's worthiest citizens. The italics of the last line are ours.

* * *

He says :—"The new German nation has hitherto succeeded in everything it has touched. It has applied itself to the realisation of each purpose in turn, with an intellectual foresight and a masterly method which have moved to their ends with something like the certainty of fate. The same spirit of steady forethought and practical preparation, applied in turn to education, war, and industry, is to be applied now to the extension of maritime commerce and the creation of colonial empire. Herr von Bülow has hinted, not obscurely, that in the twentieth century the trident might be expected in the regular course of nature to pass from the enfeebled hands of Britain to some younger and more vigorous grasp. It is the faith of every German that a people of sixty millions must make its own destiny. It is the opinion of most Germans that England is verging upon the state of senile decay."

* * *

There is no reason, continues the writer, to dismiss German aspirations towards commercial and maritime supremacy as a vain imagination. Then follows a contrast between Germany's present and past position. What she has achieved in one hundred years may be taken as the test of her twentieth century ambitions. The master-word of the modern German is foresight. The German conquers trade as he conquered France—by thorough study of the problem, and by complete preparation of his methods. Opportunities at every turn in life are seeking those who are prepared for them. It is the preparation that makes the difference. The German travels and speaks to every man in his own tongue, while the English merchant is content to open his letters. The German is as adaptable as the Briton is stiff. He is as ready as the Englishman is reluctant to make little changes in order to meet the actual convenience or the mere caprice of customers. He is content with small profits, and is glad of small orders. It is his principle to waste not the smallest opportunity. The result is an astonishing commercial development. *It is time that the ordinary Englishman began to sit up a bit.*

* * *

THE *Municipal Journal* is responsible for the statement that "The Chesterfield Town Council has decided to go into the brickmaking business. Suitable clay exists on the sewage farm. Brickmaking plant will be purchased, and bricks made for the new dust destructor. We congratulate Chesterfield in its enterprise. Bricks are excessively dear just now, and brickmaking is not a difficult industry. The Council will save a good deal by the arrangement, and there is no reason why it should not manufacture all its own bricks." We cannot join in our congratulations, nor agree that bricks are excess vely dear just now and that brickmaking is not a difficult industry. Bricks are cheap as it happens, and the experience of those who know, is that brickmaking is anything but easy. And in the hands of municipal authorities it is apt if anything to be harder than if conducted by private persons.

* * *

THERE are so many thorny paths in brickmaking to be trodden by those who are born to the trade, that it is small wonder if the tyro should find his self-imposed task anything but a bed of roses. Many men give up profitable occupations to embark in brickmaking, and they appear to consider that even ordinary foresight and business knowledge are the least factors towards success. Our latest example is an ex-greengrocer, who endeavoured to manufacture a "patent" brick. There was no fault to find with the brick, but the machinery was all wrong—is there any machinery that is not—and this led to an appearance before the Official Receiver. After all, one cannot help sympathising with a man whose machine costs him "hundreds of pounds in repairs," and which is "a continuation of breakdowns."

* * *

AN important circular has just been issued by the Home Office to the pottery trade, giving notice to certain steps which the Home Secretary "proposes to take with a view to securing the protection of the workers in the china and earthenware manufacture from the danger of lead poisoning." The Secretary of State is satisfied that for many purposes leadless glazes can be adopted without injury to the trade, and the special rules will therefore be relaxed for factories or processes in which no lead is used. Certain special rules which have up to now only applied to certain classes of workers, are to be applied to the whole of the workers in lead processes, and a new scale of fees for certifying surgeons is to be adopted. Fritted lead glazes are to be employed in cases where a leadless glaze is not used. Six months' further grace is to be allowed to manufacturers before this proposal becomes compulsory. Following upon this a standard of safety for frits is to be adopted within a measureable time.

* * *

THAT brickmaker is not far out who said recently that public bodies are apt sometimes to unduly harass and worry him and his co-manufacturers in the supposed interest of the ratepayer. Such a statement represents a large mass of opinion in the trade. Reports of county, district and parish councils continue to furnish us with the means of observing that this form of grievance is still in full force on the part of public authorities, who have no bigger or better things to attend to. It is more than two months ago since a strong attempt was made to saddle the Kingsteignton Clay Co. with the greater part of the cost of the upkeep of the roads in that vicinity, on the ground that the wear and tear of the said roads by the rolling stock of company constituted exceptional traffic within the meaning of the Act. "Therefore," said some jack-in-office, "the company ought to pay." The Company said they must have better information than this rash opinion before they pleaded guilty to wearing down the roads excessively. A great many of their carts did certainly traverse the roads, which must necessarily be the case, but they were large ratepayers and contributed quite their fair proportion to the public expenditure. To the honour of Devonshire, no proceeding has been authorised in the case.

THE BRICK-EARTHS OF GREAT BRITAIN.—XXX.

North Northamptonshire.

We next approach a very fruitful clayworking area, which it will be desirable to describe in general rather than in special terms, as only one formation of particular interest to the clayworker occurs in it. The map (Fig. 1) defines that area as including Kettering, Wellingborough, Thrapston and Northampton, and it will be observed that the clays of the Upper Lias formation are the only brick-earths selected for the delineation.

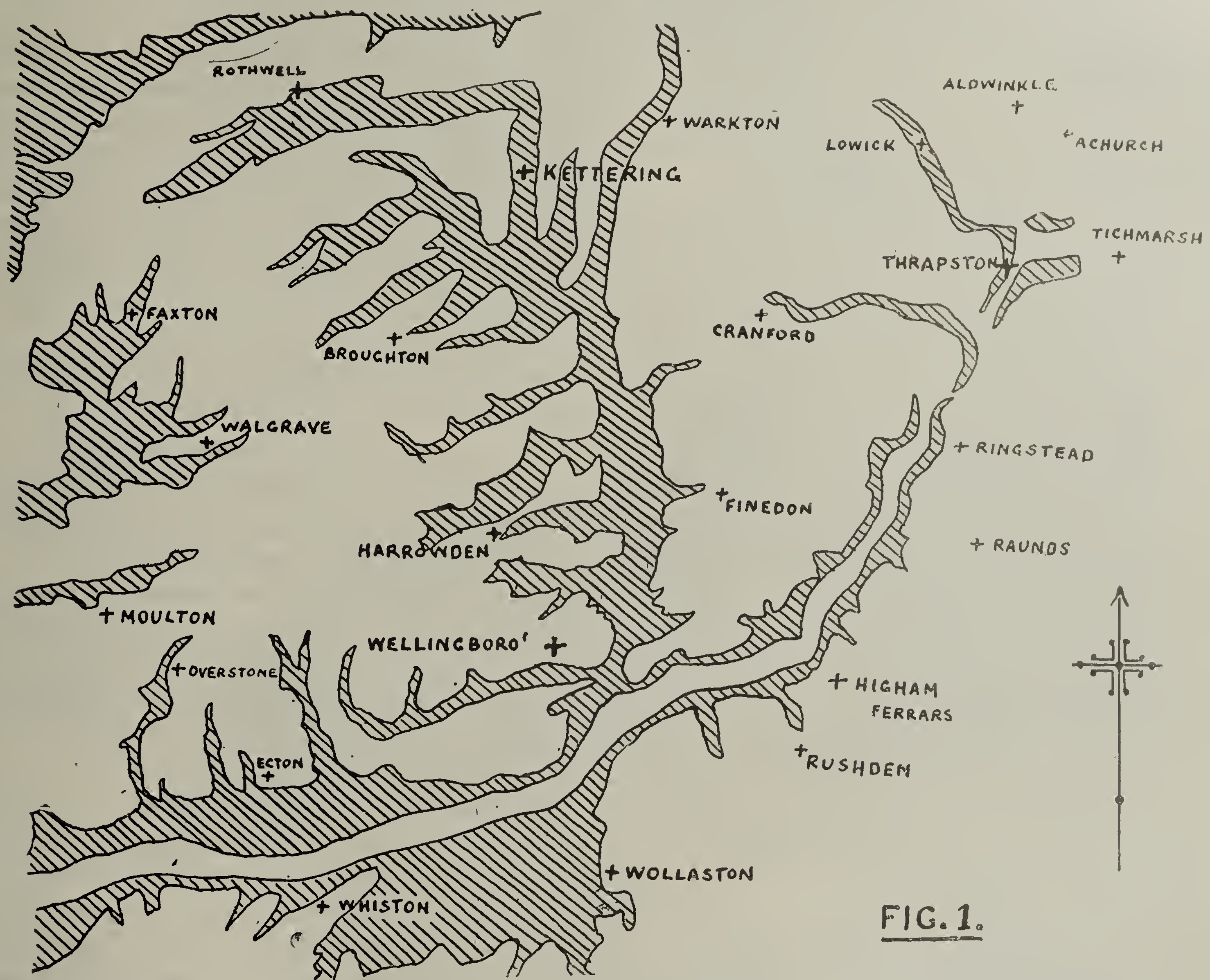

FIG. 1.

Fig. 1.—Sketch Map showing outcrops of the Upper Lias Clays in the neighbourhoods of Kettering, Wellingborough, Thrapston and Northampton. (The shaded portions represent the Upper Lias Clays.)

This seems a fitting opportunity for saying a few words concerning the distribution of the Lias formation as a whole throughout England. The outcrop is a narrow one, and it commences a few miles in breadth, at and near Redcar, in north-east Yorkshire. After divers variations it proceeds in a south-westerly direction to the Humber, and on passing through the western part of Lincolnshire it gradually expands from north to south. At and near Grantham its outcrop is several miles in width, and so it proceeds to the south, its maximum breadth of outcrop being in the Midlands, especially in the neighbourhood of Rugby and Northampton. A straggling indented (plan) outcrop to the westward then brings it to Oxfordshire, and passing to the west of England, we find it bordering the Cotteswold Hills, throwing off outliers to South Wales, and expanding somewhat in Somersetshire, down to Dorsetshire, where we lose it for the moment, though it occurs, also, in the north of France, opposite.

There is hardly any part of this formation that is not of use to the clayworker; it consists throughout of clays, except the Middle Lias, which is more calcareous and yields some of the finest hydraulic limes and cements that have ever found their way to the market. These clays are not, of course, of the same quality throughout the extensive district mentioned, but they are celebrated on account of their being to a large extent non-absorptive (for clays), and they are rarely plastic, in the sense that the more superficial deposits are. There is a tendency for the Lower Lias to break up into more or less cuboidal fragments, and locally a shaley character is so predominant that the method of brickmaking closely resembles that adopted in reference to the clunch and shales of the Coal Measures.

The one great difference between the brick-earths of the Lias and some of the overlying formations, such as the Oxfordian, Kimeridgian and Purbeckian series, is that the latter are commonly more sandy, and they frequently contain tabular concretions. The Lias clays, taken as a whole, are amongst some of the best brick-earths we have. We have had occasion to say something about them before, but it is doubtful if they anywhere in the country are more useful as brick-earths than in North Northamptonshire. The proximity of building stone locally eclipses them from the building standpoint, but the following general description will show something of their capabilities.

At Harrington Dale, near Orton, west of Kettering, the marlstone is developed to the extent of 6 feet, the underlying Middle Lias clays are about 112 feet in thickness, and Lower Lias 500 feet; and between Kettering and Weekley a boring proved 18 feet of rock, beneath 44 feet of Upper Lias clay, according to the officers of the Geological Survey. Brickyards have been opened at Long Buckby, north of Holdenby, at Spratton, west of Creaton, north of Hazlebeech, Naseby, near Oxenden Magna, and Arthingworth. The clays at these last-mentioned localities have the advantage that they are not fossiliferous, and so the clays are free from certain deleterious matter. Mr. H. B. Woodward remarks that the Upper Lias is covered by a large outlying mass of Lower Oolites, extending from Northampton to Rothwell and Kettering. He records the following :—

Section at Moulton Brickyard.

Brown sandy soil :—	FT.	IN.
Yellow and brown sands, with films or layers of ironstone	9	0
Thin beds of ferruginous sandstone.		
Ferruginous and calcarious sandstone, with masses of argillaceous limestone	6	0
Blue clay, sandy near top, with occasional septaria, &c.	15	0

The blue clay is, of course, the principal clay-working bed, but the sands above are useful for mixing with it.

There are many brickyards in the vicinity of Kettering in the Lias clays, and they commonly yield much selenite; and here, again, the beds are fairly pure. On the road leading towards Geddington, and on the Barton road also, there are some brickyards in these beds. In the valley of the Nen there are brickyards at several places, as at Castle Ashby, north of the Midland railway station, Wellingborough, and between that place and Finedon; west of Wellingborough, and east of the London and North Western railway station; Higham Ferrers and Irthlingborough. The Upper Lias at Wellingborough is evidently very thick; a well sunk at the Midland station reached the Marlstone rock-bed at a depth of 150 feet.

It has been shown by well-borings near Northampton that the unfossiliferous beds of the Upper Lias consist of dark blue clay with pyrites upwards of 60 feet in thickness; selenite and jet are abundant. Calc-spar is also found in these beds. Mr. Woodward remarks that the occurrence of such unfossiliferous beds, accompanied by selenite, may be attributed simply to the destruction of the organic remains and consequent formation of selenite. We do not quite see this. The organic remains *per se* would be merely calcium carbonate; whilst selenite is a hydrous sulphate of lime (gypsum). This makes some considerable difference to the clayworker, because, when calcium carbonate alone is present it is easily got rid of, whilst the calcining of selenite (gypsum) leads to much greater difficulties. It is the difference between dealing with builders' lime and plaster of Paris.

In a brick-yard, north-west of Blisworth, near Northampton, the following section is shown :—

Section at Gayton Brickyard, Northampton.

Blue and brown clay, chalk, flint, &c., 20ft. to 25ft.
Blue, slightly micaceous clay, with small nodules and slightly calcareous concretionary seam, 25ft.

The uppermost portion of this section is boulder clay, and not of much use for brick-making, unless the chalk nodules and pieces of flint are either eliminated or ground up very fine. The clays extend over a considerable area eastwards to the Preston Deanery and Horton, and have been worked for brick-making at Wooton.

The Upper Lias clay is well shown in brickyards at Northampton; in one, known as the Vigo pit, on the southern side of the town, and in three pits near the Kingsthorpe road on the northern outskirts of the town. The clays are exposed beneath a covering of the Basement-beds of the Northampton sands (ironstone, and ferruginous sandstone with nodules), 2 or 3ft. of which beds are exposed in places. Beneath, there is usually from 18in. to 2ft. of grey shaley and ferruginous clay, which passes down into the ordinary blue clay with nodules of argillaceous limestone. The thickness of the clay at Vigo brickyard is rather more than 30ft. It is a strong, solid, tenacious clay, eminently suited for brickmaking, and thoroughly characteristic of the Lias clays of the Midlands.

The sketch map (Fig. 1) indicates that the Lias clays are exposed in practically all the river valleys in this part of Northamptonshire, they are conveniently situated for both road and rail carriage, and they make a good, sound, wholesome brick when properly mixed and burned.

It is not a little curious that only a few miles away to the east and south-east of the area, just described, that we find a very different though equally useful sort of brick-earth. Fig. 2, depicts an area of which the town of Harrold is the centre, a few miles to the east of Northampton, and here we see that the Oxford clay is the predominating brick-earth, though there are several kinds of superficial deposits more or less suitable for making the commoner kinds of bricks. The Oxford clay here is very similar to that at Peterborough. It is quite as suitable for brick-making, and we have often wondered why it has not been taken more notice of. A section through the district (Fig. 3) shews that the Cornbrash and members of the Great Oolite Series are found on the more elevated parts of the country. These latter are not particularly useful to the clayworker hereabouts, though the calcareous portions of the Cornbrash, where they rest directly on the Oxford clay, might be employed to render that clay lighter.

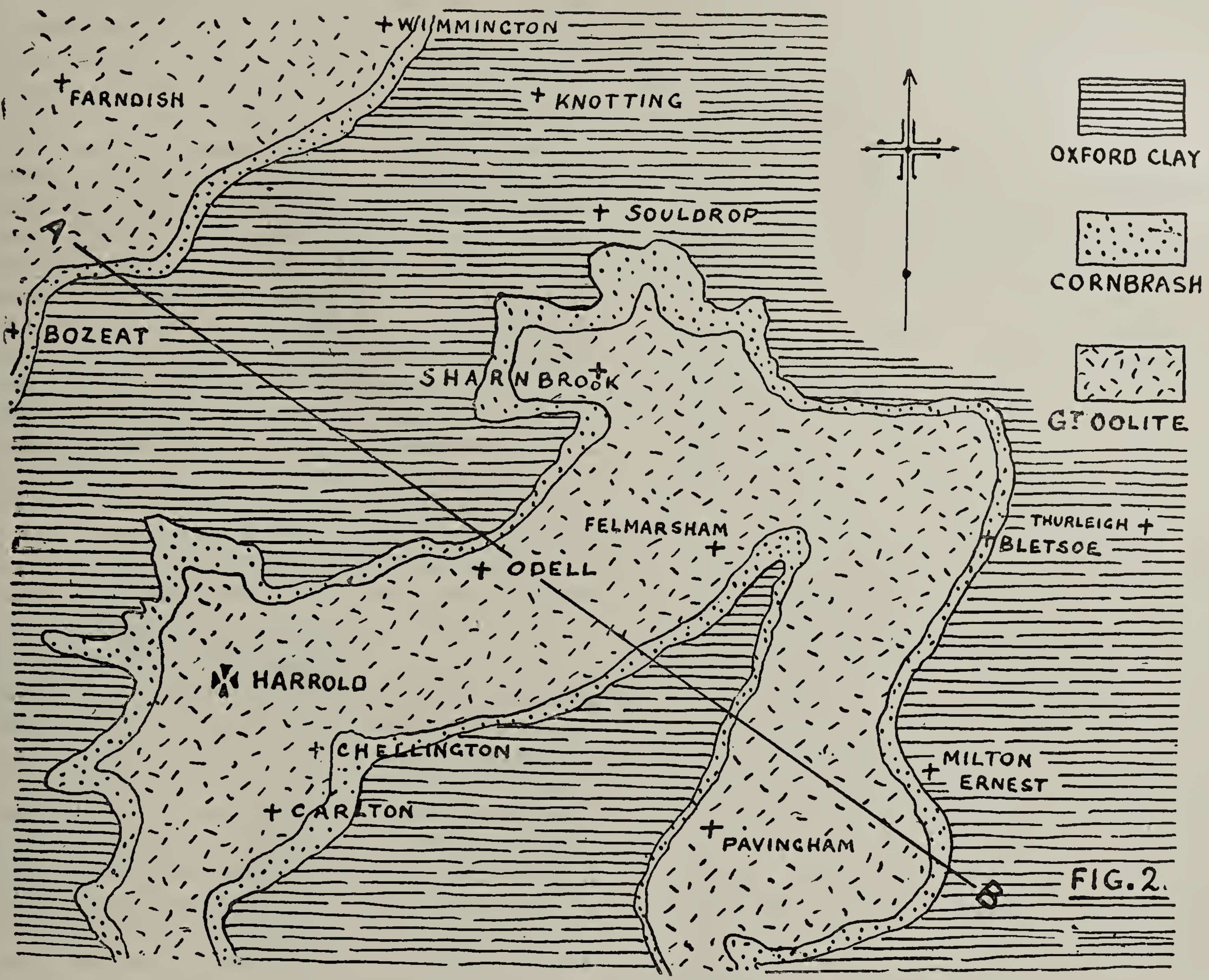

Fig. 2.—Sketch Map shewing the distribution of Oxford Clay &c., in the Harrold District.

FIG.3.

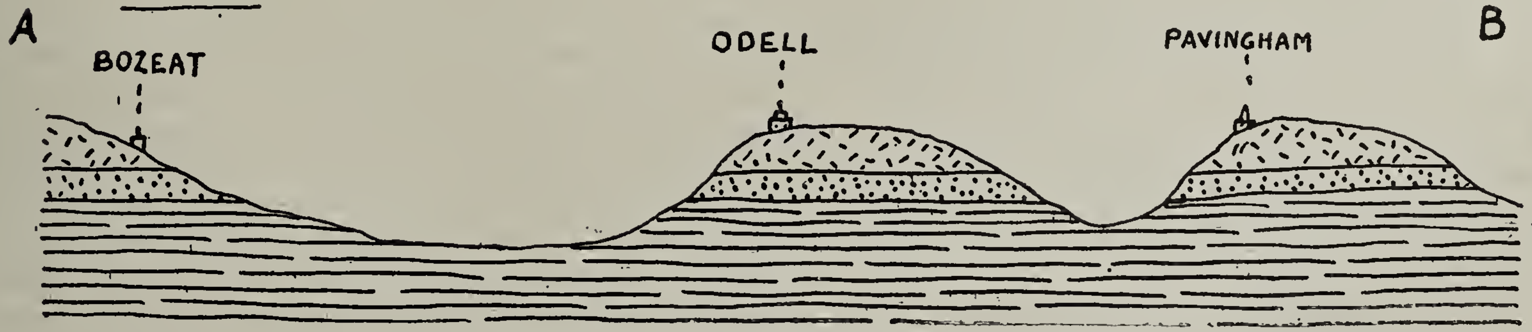

Fig. 3.—Section along the line A—B in Fig 2. (The symbols in both map and section indicate similar formations.)

The most promising ground for the brickmaker desiring to open up a new district is, however, to the north, north-east and east of the Harrold district, especially towards Kimbolton and Huntingdon.

1899-1900.

On the whole the year just ended has been a prosperous one for brickmakers, although during the closing months the trade has been severely handicapped, owing to the dearness of coal and the incapacity of the railway companies in dealing with goods traffic. Unfortunately, at the moment, there does not appear to be any probable removal of either of these drawbacks. Coal is increasing in price, slack, for instance, being just double the price it was a few years ago. It is not, however, so much the increased price of coal as the inability to obtain it, that is putting a check on brickmaking operations. As a consequence, prices are rising all round.

Despite statements to the contrary made by certain interested parties, the prospects for the present year are bright. In London alone there are schemes prospected that will involve an outlay of from 50 to 60 millions of money. In all this the brickmaker will share. There is London's main drainage scheme, to which we refer on other page; the Metropolitan Asylums Board will be issuing at least seven contracts, for the building of hospitals, etc., involving an expenditure of over a million sterling; the Borough of West Ham is spending three millions sterling on artizans dwellings, new baths and wash-houses, fever and infectious hospitals, and on the re-building of the technical institute; the London School Board has many new schools on its programme; and there will be the general rebuilding of London in progress. Throughout the country there are new railways as well as new dock and water schemes projected, to say nothing of general building business.

The Institute of Clayworkers continues to make great progress, nearly 100 members having joined during the year. Its phenomenally successful trip to Germany, in May, is not likely to be soon forgotten by those who had the good fortune to take part in it. A departure from the customary excursion abroad takes place this year, visits being arranged to various representative yards in this country. The Annual Meeting and Dinner of the Institute will be held in Birmingham.

The British Clayworkers' Mutual Insurance Corporation, Ltd., has also had a successful year. The report and balance sheet appear in this issue, and are well worth close study by all employers of labour. The Company is a striking testimony to the value of trade combination, and by this time next year there ought to be few clayworkers in the country who prefer paying to outside offices, profits that should accrue to themselves.

Appended are trade reports from various centres: —

Bridgwater.—During the past year there has been no very marked feature to record in connection with the Brick and Tile industry of the Bridgwater district. Quite an average demand has been well met and ruling prices have been fairly maintained. In some localities competition has been keen, and in parts of South Wales usually supplied by Bridgwater firms severe depression in the building trade has had some effect. On the whole it is not anticipated that more than very moderate profits will be realised—indeed the serious advance in the price of coal and other materials, incident to the manufacturer of brickyard goods, is a matter of considerable anxiety to the proprietors and will probably necessitate a revision of prices to meet increased cost of production.—The long-standing vexed question between the Bridgwater Town Council and the Somersetshire Drainage Commissioners who claimed ownership of the river banks, has resulted in the complete discomfiture of the Commissioners; they were not satisfied with the decision of the "Court below," and appealed to the "House of Lords." "The appeal has failed on all points and is dismissed with costs," was the unanimous decision of the highest and final Court of Appeal. The decision has been hailed with deep satisfaction by the general public and especially by the brickyard proprietors on the banks of the river, who now hope to be free from undue interference with their claim of legal and prescriptive rights, by or on behalf of a few and arbitrary spirits amongst the Commissioners who appear to have dominated the Board for some time past. And it may be hoped that the Bath brick trade, which is peculiar to the banks of the river Porrett, may yet flourish.

Carlisle and District.—The clay industry in the North has had a very good year generally. Stocks are about all sold out, and prices have steadily increased with the advanced price of coal, which is at present time very scarce and 40 per cent. above the price of two years ago. The hand-brick trade is fast going out of date—as the quality is inferior to machine-made bricks. The chief supply of common bricks in Carlisle is from the Kingstown Brick Company (wire-cuts and continuous kiln), and James Beaty's, Kingstown (with two stiff plastic machines and two continuous kilns), also from Botcherby with wire-cut machine, which is nearest the city. For facing bricks the chief supply is from the three works at Cum-Whinton on the M.R., where there are excellent beds of red plastic clay, viz.: Mr. Claud Lonsdale's, of the Carlisle Brick and Tile Works, Mr. W. Hamilton's, and Messrs. J. Beaty & Co.'s Crown Brick and Tile Works. The latter have recently put in a special new fit-up in machinery by Messrs. J. Jones & Sons, of Loughborough, comprising wet-clay pan, double set of rollers and pug-mill, with power cutting table. These are doing good work, and extensions to kilns and drying sheds are soon to be in hand. The drain-tile trade is also the best it has been for some time, and although prices have considerably advanced, stocks are clearing away fast. The brick trade in West Cumberland, particularly at Workington, has been extra busy during the past year. The coal and iron trade in this district at present is very active, and new docks are proposed for both Workington and Maryport. The brick and tile trade at Annam (which is just over the border) has had a record year for business. The prospects for the ensuing year at Carlisle are very promising. The new Water Works are expected to be commenced early in the spring; the Gas Works contemplate an extension immediately, to cost £30,000; the Electric Light Works (only recently completed) are to be extended; and plans are already in hand for enlarging the public slaughter-houses; the Electric

Tramways are well in hand, and are now commencing to build the car-sheds. These works, together with a number of new streets and houses to be provided, make the outlook for brickmakers a very bright one.

Cowley District. — STOCKS.—The trade of the Cowley District during the past year has been of an unexciting character, prices have had a slightly downward tendency towards the end of the year, but this it is thought was the result of a certain amount of uneasiness caused by press notices rather than by any great falling off in the demand. The Cowley Brick Industry presents a striking illustration of the immense loss to the manufacturers of a particular district, through the lack of an effective trade combination. In the old days it was an accepted fact that Cowley Stocks always sold at two or three shillings per thousand above Kent Stocks; but the Cowley markets have for some time past seen Kent bricks selling for two or three shillings per thousand above the price realised for Cowley bricks—an object lesson which, it is hoped, will have some effect in emphasising the advantages of combination. Several new brickfields having been opened in the district, labour has been short, and ashes and breeze at an inflated price; these factors have materially added to the cost of production, and some of those sanguine individuals who have been investing their capital in brickmaking will, we fear, have a rude awakening. At the present selling prices there can only be a very moderate margin of profit. We see no reason why prices should not be maintained, as there is a considerable amount of constructive work in hand and in view, and although new fields have opened, the make has been short, a considerable amount of prepared clay having been left on hand.

Edinburgh and District.—The works around Edinburgh have had, generally, full demand, and are well booked into next year. The demand in Edinburgh has been unusually great arising through heavy railway contracts, and building all round has been on the boom, though there are decided indications of a slackness. Dear money will put a stop to speculative building, and the railway extensions are nearing completion, and with the many additional works erected by large coal masters and others in the neighbourhood making a composition brick for supply of Edinburgh market, it is possible there will be a collapse in Edinburgh trade ere long, though it is quite the case that bricks are being very much more largely used in Scotland than formerly, our buildings now being merely veneered, I may say, with freestone, which is very difficult to be had. Though there has been a very full demand, there has been an absence of fancy prices, and at present, bricks delivered in Edinburgh may be said to be 29s. to 30s. per 1,000, but it must be remembered that a 3¼in. brick is made. Fuel has advanced in price to a serious extent; for dross or slack, firms are paying exactly double what they did when bottom prices were reached, but this has arisen in a great measure through railway companies being unable to supply empty wagons and work traffic regularly, throwing the collieries unnecessarily idle. The labour question is also a very serious one, great numbers of men employed going to the coal pits when wages mean a serious item to miners. The coal masters make their composition bricks from fireclay and other refuse which costs them nothing, having formerly been simply drawn from mines and banked as waste; and there are many huge mounds of such being now utilised for brickmaking. Firebrick makers have been pressed for deliveries throughout the year, prospects for the coming year are equally good; costs have gone up considerably, particularly fuel, which is practically double what it was, and the enhanced prices obtained do not work out so profitably as might be expected.

Exeter.—During the past 12 months there has been a good demand for bricks. The trade generally has been brisk, owing partly to some public institutions being built in this locality. At present there is not any great demand for bricks, and the great increase in the price of coal, labour, &c., will materially affect the price of production of all brickyard goods, and consequently will check any very great demand for bricks, &c., for speculating building.

Glasgow.—COMMON BRICKS.—As in 1898, the building boom continued over most of this year, in all the great centres of population where public works and tenements of houses to provide for the housing of the workers have been built in enormous numbers. Wherever possible, bricks have taken the place of stone, the price of the latter having gone up, and quarrymasters not being able to meet the demand. The prospects for 1900 are somewhat like those of last year, which has been so satisfactory to the producer, the high price of fuel not affecting this branch very seriously.

Kent.—STOCKS.—The past year has on the whole been a good one in the Kent brick industry. Those brickfields which supply the local demands of the various towns have done well, owing to the continued prosperity of the building trades, and are likely to continue to do so during the coming year. The enormous Government works at Chatham are swallowing up very large quantities for the supply of which Mr. R. D. Batchelor of Chatham has the contract. These brickfields which supply the London market are, however, in a different position, and these constitute by far the most important part. The prices of Kent Stocks in the London market has fallen 4/- per thousand last October, and a further 2/- per thousand since Xmas, owing principally to the keen competition of the Fletton and Leicester bricks. The wisdom of the last reduction in price by the Kent and Essex Brickmasters Association is open to question, particularly at the time of the Xmas holidays, when for two or three weeks builders as a rule refrain from ordering, preferring to wait till the turn of the New Year. It is, however, to be hoped that the Association will reconsider their position a little later on in view of the good prosperity of the building trades in London for the coming year. It seems a pity that prices of bricks should be forced down at a time when the prices of all other materials and of labour are advancing so rapidly.

Leeds (Fireclay).—The fireclay industry in Leeds seems to have shared in the general prosperity. Local firms report that they have been kept fully employed throughout the year, and the prospects are of an encouraging character now that the troubles in the building trade, upon which so much depended, have been settled. It might have been expected that the recent strike would have had an injurious effect upon fireclay products, but as it was only partial, local firms were not affected to any material extent. The industry in Leeds at any rate did not suffer, and the local specialities in terra-cotta, faience, glazed and firebricks have been in as great a demand as ever they were.

Leicestershire.—Brickmaking here during the past twelve months cannot be said to be of a very encouraging character. Owing to an unfortunate dispute between the Master Builders and Bricklayers' Labourers, which commenced in the early spring and continued for six months, right through what should have been the busiest time of the year, the building trade of this district was at a complete standstill ; consequently large stocks of bricks accumulated in all the local yards ; and although work has been resumed, and plenty of it, there are still large quantities of bricks on hand with some of the manufacturers ; this, unfortunately, is causing a tendency to pull the prices down somewhat ; so that taking the year altogether, the brick trade in this district has not been so good as at the commencement it seemed likely to be.

London.—SANITARY AND POTTING.—In looking back on the returns for the past twelve months, clayworkers, in and about the near neighbourhood of the Metropolis, have small cause for complaint. Indeed, there are many cases where the turnover has exceeded all expectations. The demand for ordinary brick has been steady and regular, perhaps the most noticeable feature of the year's trade has been the marked increase in the production and use of glazed terra-cotta ; and what is more satisfactory still, the growing excellence of the manufactured wares, a condition of things that argues well for the future permanence and standing of this important section of the clayworker's art. The output and demand for sanitary wares sewer and drain pipes, gullies, channels, traps, etc., shows, in most cases, a decided increase over previous years. So with pottery as used in connection with the transmission of electricity on a large scale ; for conduits and for purposes of insulation generally. The public interest in Sanitation seems unbounded ; clayworkers may rest assured that, provided they will give the necessary attention to the work, there will be no diminution of orders for many years to come. These are royal and stirring times for the sanitary and electrical industries. The war in South Africa has done much for the potting industry, in London, during the past year, large orders having been placed—and many executed—for bottles and jars, as used for the storage of spirits, preserves, etc., for shipment abroad. There are indications, on all sides, of a healthy and vigorous future. The only grounds for uneasiness on the part of the clayworker, and which may influence, to no inconsiderable extent, the profit and loss account for the ensuing year, are those connected with the serious rise in price and growing scarcity of fuel. The present outlook, in this direction, is not bright ; it is to be hoped that it will speedily clear. With this exception, all is well.

North Staffordshire.—The Brick and Tile trade in North Staffordshire for 1899 has been very excellent as far as demand is concerned, but manufacturers have had very serious increases in the cost of fuel to meet, and view with some concern the prospect of scarcity and possible further increase of price in this important factor in Brick and Tile manufacture. No doubt the present demand may and will allow of increased price for manufactured goods, but continued and further advances must eventually restrict demand, which would be regrettable. Good steady trade is much better for all.

North and West Lancashire.—The year opened with some considerable stock of bricks on hand in many yards ; the colliery proprietors sent out a New Year greeting in the shape of a rise in price of fuel of 25 per cent., and they have kept on repeating it during the year, until slack is now about twice as dear as it was two years ago. There was a good demand at Liverpool and district in the early part of the year, and some advance was made in price for a time, but the demand fell off again about midsummer. In Southport there has been a very limited demand, the Brickmakers' Association there have, however, been able to get fairly remunerative prices by their united action ; they have also fixed a standard size of bricks during the year, which are now in no case to exceed 3in. thick. In some cases formerly, bricks were made 3⅛-in. thick. The association has also settled the vexed question *re* payment of carriage. Formerly manufacturers paid carriage as well as supplied the bricks—when in case of bad debts they lost both cost of materials and carriage for same, they have at last come to the reasonable conclusion that to lose cost of materials is bad enough, not to mention carriage, which in most cases is about 20 per cent. on material ; they now leave the railway company to collect the item from consignees. At Morecambe Bay there was a fair demand during the year, which has lately fallen off considerably. At Blackpool the trade has not been at all satisfactory, the supply far exceeded the demand. During the building boom of years 1895, 1896 and 1897, there were more new brick plants put down than can now be kept going, some are already closed. At Preston and district there has been a very fair demand during the year, prices, however, ruling low, owing to competition. The New Electrical Equipment Works there has consumed about three millions, principally supplied by the Littlewood Brick and Tile Company, and Mr. Henry Alty, of Hesketh Bank Brick and Tile Works. Mr. Alty has also had an order for upwards of three millions for the L. & N. W. Rly. widening at Preston, a good quantity of which has still to be supplied ; he has had to increase his output considerably to meet this demand. On the whole the year has been a fairly prosperous one, but unless the colliery proprietors draw in their horns and supply fuel at something like a reasonable figure, the price of bricks must either advance or brickmakers had better find other openings for their energies.

Rugby.—At the commencement of the past year there was every indication of the brick trade being dull. The demand for working-class houses, consequent on the recent removal of Willans and Robinson's engineering works from Thames Ditton to Rugby being satisfied, most of the speculating builders turned their attention elsewhere. Contrary to expectations, however, the various building contractors remained fairly busy with private contracts, and the local yards have been kept well employed. During the year the British Thomson-Houston Electrical Engineering Company have acquired a site of some thirty acres for new works on the north side of the L. & N. W. and Midland Railways Station. Tenders are already invited for No. 1 Contract (Earthworks and Foundations), and towards Spring the new building should be in full progress. The works are expected when completed to employ upwards of eight hundred hands, and the demand for houses of the artizan-class will no doubt again be very great. Prices obtained in the trade have ruled low, chiefly owing to the competition from yards which, with good railway accommodation in colliery districts, and a large output and a general slackening of the building trade in the Midlands, are glad to find any outlet for their surplus production.

The Potteries.—The pottery trade cannot be said to have had its fair share of the general improvement which has taken place in most industries in this country during the past year. To most manufacturers the result of the year's working, though generally speaking better than that of the preceding year, has not been altogether satisfactory. Possibly this is partly attributable to the fact that the potting industry is as a rule one of the last to feel the effects of renewed prosperity in the country after a period of depression of trade. Be that as it may, the year has not been so profitable to manufacturers as might have been anticipated. Some improvements in prices have taken place, and the volume of trade has on the whole increased, but these advantages have been fully balanced by the very large increase in prices of all the materials used in the manufacture of earthenware and china. The price of coal and slack has gone up something like 40 per cent., which of course makes a very great difference in the cost of producing pottery ware, in the manufacture of which so much fuel is necessarily required. The hopes of some manufacturers that a material advance in the price of earthenware would be obtained through the efforts of an alliance between the masters and men were doomed to disappointment. The attempt to form such an alliance on the lines adopted by the masters and men engaged in the bedstead trade proved abortive, and early in the year the scheme was abandoned, much to the disappointment of some manufacturers, who regarded some such combination as the only means of checking what they regard as unfair competition, and at the same time much to the joy of many other manufacturers, who vigorously opposed the scheme, which they regarded as an attempt to coerce all manufacturers into adopting fixed prices and to repress individual energy and ingenuity. Throughout the year trade in the home markets has been brisker than in 1898, and prices have risen slightly, but not sufficiently to make many lines of goods remunerative to the manufacturers.

With regard to the American trade, the returns show an increase in the exports from the potteries to the United States as compared with the previous year, but it must be remembered that 1898 was one of the worst years in the history of the trade. The number of packages sent out that year was 63,744, the smallest since 1885. Up to December 23rd last year 73,168 packages had been exported to America, and probably the total for the year would be about 75,000. Although that is an increase of between 11,000 and 12,000 over the preceding year the figures compare very unfavourably with those of 1895, when the high-water mark of the trade with America was reached, 121,000 packages being shipped to the United States in that year. Although 1895 was, of course, an abnormally good year, the average shipments during the last twelve or fourteen years have been about 90,000 packages, so that last year's export trade with America is very much below the average, and a great deal of leeway has to be made up before the trade reaches what may be regarded as its normal volume. It must also be remembered that while the shipments of earthenware to the United States have fallen off greatly during the last few years, the capacity of the factories at home for turning out pottery has increased to a very considerable extent. Consequently manufacturers sustain a double loss, firstly by the decrease in the output, and secondly by the fact that their expenditure has become greater, owing to the increased capacity of their works. The effect of the good trade experienced in the United States has not reached this country yet, or at least the North Staffordshire Potteries; but probably if the prosperity of America continues it will soon begin to have a beneficial influence upon both prices and output. The sales in Australian markets have been fairly maintained, and the trade with Brazil and the Argentine shows some improvement. One gratifying feature of the year's trading is that the exports to outside markets—*i.e.*, to markets in regard to which no separate returns are published—shows a tendency to expand. As was the case last year, the exports of earthenware and china to Germany have increased in a remarkable manner, but as the improvement is largely due to the great demand for English sanitary ware on the Continent, the increase only benefits a few manufacturers in the Potteries. There seems to be some prospect of trade improving during the present year, but as the prices of coal and other materials are still rising it is doubtful how far manufacturers of pottery will derive advantage.

[*Further reports will appear in our next issue.*]

FUEL FOR STOCK BRICK BURNING.

THE VALUE OF COAL DUST.

WE consider this a suitable occasion for reminding our readers of an article on the above subject, published in our issue of December, 1898.

One reason for doing so is that a manufacturer has sent us his experience in the use of coal dust in place of London dust for the purpose. At the end of last season he informs us that he tried a clamp of bricks, half of which at one end of the clamp had been made in the usual way with London dust, and the other half with coal dust. All the clamp was treated alike in the matter of cinders for the bottom, and the outside casing was well plastered with clay to prevent too rapid combustion.

The coal dust was added to the clay heap to a depth of 3¼-in. per yard depth of earth, the proportion of house dust soil for the same depth being 9 inches.

The result proved conclusively in favour of the coal dust The clamp was more uniformly burned and the bricks brighter in colour, harder, and less blistered.

As stated before, the quantity of coal required is about 2½-cwt. per thousand bricks, as against 7-cwt. per thousand of house dust, and the comparative total cost of fuel about 3s., as against an amount reaching as much as 4s. 6d.

IMPROVEMENTS IN THE MANUFACTURE OF BRICKS.

THIS is a new patent, the inventor, Mr. F. A. Remington, of St. Helen's, claiming as novel the use of waste sand from plate glass grinding mixed with either of three sets of other ingredients :—

1. Powdered cinders or ashes.
2. China clay and ball clay (finely powdered).
3. Waste lime.

Being mixed in stated proportions and formed into bricks, these various mixtures are burned in clamps or in kilns.

Without going into the question of the success of the results from the point of view of durability and appearance, we think it only necessary to remark on the limited application of the idea. Further than this it appears extremely improbable that the cost of the mixture could be brought down to that of natural clays, which are so plentifully sprinkled over the face of the earth.

The practical application of the waste product spoken of is much more likely to be successful in the manufacture of artificial lime, stone or bricks, either without application of heat or by the new methods of treatment with steam and carbonic acid gas.

THE SEPARATION OF STONES FROM CLAY.

A correspondent writes:—An article appeared in the last issue of your Journal on the above subject, which showed the writer to be alive to the importance of it, and also to the means which had been adopted in dealing with an old standing trouble.

The separation of stones from clay has commanded a good deal of attention amongst those interested in brick manufacture, who have been specially troubled with this mixture in their material. There has never been any difficulty in separating the stones; the only trouble has been to effect this at a cost which the selling price of the bricks would bear. This is the crux of the whole question.

Reference was made to the apparatus which has been invented by Messrs. Rossborough and Pile, of Dublin. The writer has witnessed this in operation, and there is no doubt about the success of it, but the cost of the performance is prohibitory, except in localities where a very high price can be obtained for the bricks, which is the case in the instance referred to.

A very ingenious apparatus was also invented by a brickmaker in the neighbourhood of Newcastle for the same purpose, by which the inventor was most sanguine that he had solved an important problem. In the writer's opinion he had no doubt done this, but there was the initial cost and also that of operating the machinery, which killed the whole thing.

The writer was induced some years ago to provide money for carrying out an idea which a very intelligent brickmaker had conceived of an apparatus for this purpose. The result of it was a failure on the same ground as had followed similar attempts previously.

It is very difficult for a Britisher to acknowledge he is beaten, but if there is no other course left for him, it is an evidence of courage to admit this. In America, where it is said many wonderful things are done, the success clayworkers have had in dealing with this difficulty was referred to in the article. The writer is well acquainted with the American system, having witnessed it in operation in many instances, and bears testimony to the success of the method adopted. It is most interesting to watch the stones rolling down the shoot provided for them, as clean as if they had been washed. This is done without any increase in the cost of brick manufacture at all, and finding how beautifully the work was done, the writer said to himself, "Now I have it, and I am going to inform my English friends of this, and will have a similar apparatus made, and demonstrate its efficiency without delay." When he got home he told a "shining light" of the British Clayworkers' Institute of his discovery—one who was greatly troubled with the mixture of stones in his clay, and was very anxious they should be "hunted down." He was therefore ready to adopt the apparatus as it was explained to him. This was done, but, sorrowful to tell, all the hopes that had been fondly built upon it were dashed to the ground, and the apparatus was consigned to the scrap-heap in unpardonable disgrace. What was the trouble with it? Why the clay and stones had such a fond attachment for each other that the clay would not allow the stones to go without it going as well, and it was more provoking than a little to see them both persistently travelling in the same direction. This is the unsolvable difficulty, except at a prohibitive cost.

It will be asked, "Why then did they succeed in America?" The answer is: Because the material there is entirely different to ours in this country. There, wherever stones are found intermixed with the clay, they are in a free state. The clay is of a sandy nature, and does not adhere to the stones mixed with it, consequently they are easily separated from each other, hence the success of their method. In this country, where stones are found intermixed with the clay, they are embedded in it, and they can only be separated by the clay being dried, and then being all so knocked about that the clay falls to powder, and the two materials being passed over a screen, the dust falls through, and the stones pass out at the end. The washing method is an undoubted success, but both these methods, as will be very easily seen, are prohibitory on the ground of cost in working, except where high prices can be obtained for the product.

Seeing it is practically impossible to separate the stones, why separate them? Unless they are lime, and even when they are such (except they form a very large proportion of the clay) to retain them in the material will improve it rather than injure it. It may be asked: How can this be? The answer is: If they are crushed into a very fine powder and incorporated with the clay the quality of the bricks is admittedly improved as they retain their shape better, and in some instances the bricks are improved in colour.

It may also be asked, "Is it possible to break down the stones to this fine condition, and also to thoroughly intermix them with the clay?" Most certainly it is, and is being done. There is much greater difficulty imagined of the detriment of the intermixture of stones with clay than there need be, and it is claimed that the Americans are taking out of their clay that which, if retained, would be a benefit rather than an injury. Their stones are usually of a sandy nature and not lime, and it has been somewhat of a surprise to the writer that the utilitarian mind of our American relations has failed to discern this.

Messrs. Rossborough and Pile, whose apparatus was referred to, have a large proportion of stones intermixed with their material, I believe some fifty per cent., which are lime, so that they are obliged to separate them, and being in a market where a very high price is obtained for bricks, they can afford to increase the expense necessary to manufacture them. Such conditions, however, are exceptional, and where limestone is a trouble on account of the excess of it, and the market price of bricks is such that it won't permit of separating them, why trouble about them at all? It would be better to leave them alone and seek for more favourable material elsewhere.

Death of Mr. J. Holdsworth, of Mexborough.—We much regret to announce the death of the above, which took place, very suddenly, late on January 6th. The deceased for several years was the manager of the Mexborough Brick and Sanitary Pipe Co., and under his guidance the works have been put on a very prosperous footing. Mr. Holdsworth was a prominent conservative, and a member of the Mexborough Conservative Club.

Fire near Birkenhead.—On the morning of January 8th, at an early hour, a fire broke out on the premises of the West Cheshire Brick Company, the property of Mr. Barnes, of New Ferry. The Birkenhead and Port Sunlight Fire Brigades with steam fire engines were in attendance, and promptly got to work, but great difficulty was experienced in finding water, which had to be pumped from the neighbouring ponds. After about three hours' work, the fire was conquered, but not before the woodwork of the three-storey building had been destroyed. The machinery was saved, but may be damaged. The premises were insured.

BRICK DRYING.—I.

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Scope of Treatise.

It is proposed in a few papers to look somewhat closely into the science and practice of brick drying. In confining the papers to brick drying especially, it does not follow that much which is stated will not apply to the drying of the more high class and artistic of the wares known in the ceramic industry, and some mention will be found of the treatment of such other wares in dealing with the general sub-division of the subject.

Natural and Artificial Drying.

To the brickmaker, the practice of drying bricks seems to divide itself obviously into two sections; drying without heat or natural drying, and drying with heat or artificial drying. When examined scientifically, it is at once seen that this mode of expression is inaccurate, and that the correct way to describe the two methods of proceeding is :—Drying by large volume of air at ordinary temperature, and drying by small volume of air at artificially increased temperature.

No drying, *i.e.* evaporation of water or moisture, can take place without absorption of heat. This fundamental fact is often lost sight of by the practical man, because a large volume of air will yield the requisite heat for the evaporation, without appreciable reduction of temperature.

Fundamental Scientific Facts.

In order to put the scientific facts with regard to evaporation of water in a manner easily appreciated by the unscientific, it may be stated that one pound of water at 62^0 F. requires the same amount of heat to evaporate it as would cause 7¼ pounds of water at 62^0 to boil.

Yet the one pound of water may be evaporated out of a brick, without the brick or the water being heated above 62^0. But to perform this operation a certain volume of air must be provided at a rather higher temperature than 62^0 to yield the requisite heat and to carry off the vapour of water.

Absorptive Power of Air.

The second scientific feature of the phenomenon of evaporation of water is the capacity of air at all temperatures for carrying or containing moisture. This property of air is of the most vital importance in all questions of drying, because on it depends the success of all special methods of obtaining the desired end.

The amount of moisture or vapour of water which air can carry, varies with the temperature. At every temperature below boiling point of water or 212^0 F. it will carry a certain definite maximum amount. When this amount is reached, the air at that particular temperature is saturated. If now the temperature of the air is lowered by giving up some of its heat to a colder body, some of the vapour immediately becomes condensed, forming dew. The temperature of saturation is also called the dew point, because of this phenomenon. Ultimately the colder body, the dew, the air, and the moisture in the air will, if undisturbed, all attain one common temperature, and the air will still be saturated with the maximum amount of vapour, which it can carry at the lower temperature.

Suppose now that the air, instead of being cooled, is warmed to a higher temperature, it will then no longer be saturated with moisture, but will be capable of taking up an additional quantity. If then a moist body be introduced into the warmed air, some of the moisture will be evaporated or dried out of it. This will continue until a new condition of equilibrium is obtained. Either the body will be completely dried; or the body, the moisture in the body, the air and the vapour in the air will all attain one uniform temperature. In this second case the air will be completely saturated with vapour, and incapable of taking up more.

Subjoined is a table giving the weights and volumes of air under mean pressure at a few different temperatures, which will contain, when saturated, 1 lb. of water in the form of vapour.

Temperature.	*Weight of Air.*	*Volume of Mixture.*
42	178·18 lbs.	2272 cubic feet.
52	122·17 ,,	1595 ,,
62	84·79 ,,	1135 ,,
72	59·54 ,,	819 ,,
82	42·35 ,,	600 ,,
102	21·98 ,,	333 ,,
132	8·49 ,,	151 ,,
182	1·402 ,,	48·7 ,,

The striking feature of the table is the rapid decrease in the quantity of air necessary as the temperature of it increases. It also shows that in the example quoted above, it is only necessary to raise again the temperature of the air to enable it to take up a further portion of water from the moist body.

A curious feature in the behaviour of vapour and air is the fact that the addition of the one to the other causes but very slight alteration in volume. The air contained in a saturated mixture at mean temperature and pressure would, if dry, occupy 98½ per cent. of the space occupied by the mixture.

Saturated air is rather less in weight than the same volume of dry air. The actual weights of a cubic foot of dry and saturated air at 60^0 F. under a pressure of 30 inches of the barometer being 536·3 grains and 532·7 grains respectively.

In dealing with air as we find it in this country's climate, we have to take account of the amount of moisture already contained in it at ordinary temperatures. It is usually large; on an average 66 per cent. of the amount at saturation. In damp weather it usually exceeds this proportion, frequently attaining saturation, and in the driest weather it seldom falls below 40 per cent.

Hygroscopes.

Several forms of instrument are used for indicating the amount of moisture in the air, or for testing its drying capability. The wet and dry bulb thermometer here illustrated, Fig. 1, is perhaps the most reliable, though, except in skilled hands, most of them can only be taken as indicators rather than measurers, as they are dependent on their position, on the air currents, wind and radiation, for their accuracy of registration.

As will be seen from the illustration, one thermometer indicates the temperature of the air. The bulb of the second is kept continually moistened with water by means of a reservoir, wick, and muslin covering to the bulb. The evaporation of water from the covering absorbs heat from the mercury in the thermometer bulb, and causes it to register a lower temperature than the uncovered thermometer.

The difference of temperature shown on the two thermometers is an indication of the rate at which the air is drying water from the cotton covering.

This instrument at the same time illustrates the fact that heat is absorbed in the process of evaporation.

In this country the average difference shown on the thermometers is 5° in summer and 1° in winter. In tropical dry climates it attains as much as 12°.

Messrs. Negretti & Zambra issue with their instruments a pamphlet by Mr. James Glaisher, F.R.S., containing tables for use with the wet and dry bulb thermometer. With their aid the humidity of the atmosphere can at any time be estimated.

Such then, are the fundamental and important facts in connection with evaporation of water, and it will be seen later the bearing they have on the various processes in use for drying bricks.

NATURAL DRYING EXPLAINED.

It will be instructive now to examine the conditions which obtain in the old and still much used method of open-air drying of bricks on the ground or in hacks. A description of the methods will be given later, but it is proposed here to demonstrate the science of the process.

A stock brick as produced in Kent and Essex, will contain, when made, about 2 lbs. of water, and when dry, ½ lb., showing that water of manufacture to the amount of about 1½ lbs. is dried out of it.

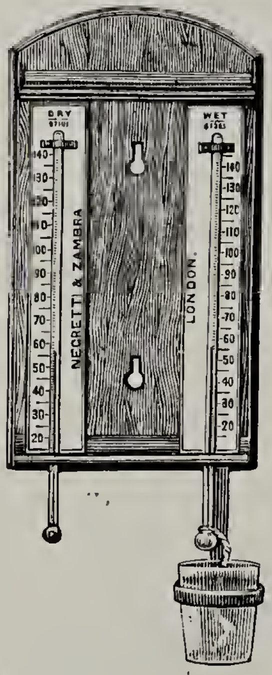


Fig. 1.

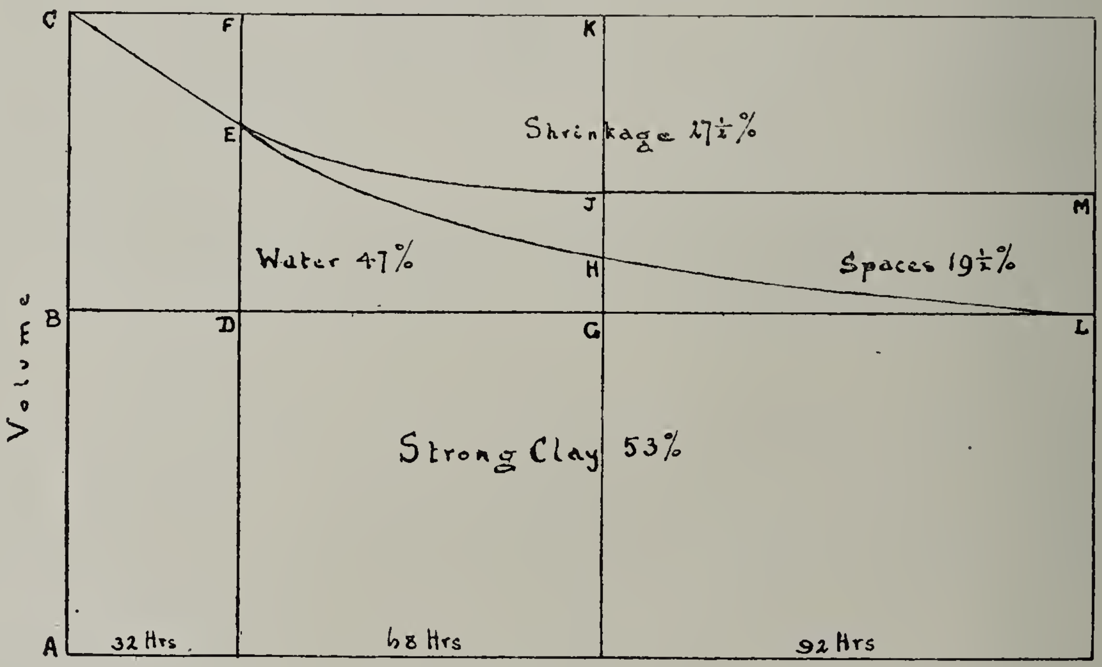


Fig 2.

Now at 62° F. this requires 1,606 English units of heat for its evaporation. A unit of heat is the amount required to heat 1 lb. of water 1° F., and the above quantity is yielded by the burning of about 2¼ oz. of ordinary coal.

In outdoor drying we use the heat from the sun, which warms the air. The air in its turn gives up heat in evaporating the water.

Now presuming that the stock brick takes a fortnight to dry and loses its moisture at a regular rate throughout that time, it will be seen that it requires 4¾ units of heat per hour to perform the drying. Presuming that the air passing over the bricks loses 1° only in giving up heat to the brick, it will require $\frac{4.75}{1 \times .237} = 20$ lbs. of air to supply the requisite heat per hour. In this calculation .237 is the Specific Heat of air, that of water being 1. This weight of air corresponds to 265 cubic feet at 63°. Thus if the brick is subjected to a current of air of ¼ of a square foot in section (36 square inches), the speed of the current necessary would be 1060 feet per hour, or one-fifth of a mile only. Such a speed of air movement is practically too slight to be felt. It can be seen further that if this current of air contained 63% of moisture, it would contain 67% after passing over the brick and being reduced 1° in temperature.

It is evident, therefore, that in outdoor drying in summer the changes in temperature and humidity of air, when there is a moderate wind, are so small as to be inappreciable. Nevertheless, the actual conditions are of such importance that at average winter temperatures and humidity of air, drying is not possible outdoors in this country at that season, even apart from the consideration of danger of freezing.

THE DRYING OF A BRICK.

It is of importance now to consider the process of drying within the brick itself and to see how it is affected by different influences of material and method and speed of drying.

MATERIAL.

When a brick is made by plastic process the clay has added to it "water of manufacture" in various proportion, according to the nature of the clay and the method of manufacture adopted. In a brick, in a truly plastic condition, this water fills all the interstices in the clay so that no air is enclosed in it except accidentally.

At a certain consistence, such as it has when fit for being formed into a brick, clay is in a pasty condition due to the particles being more or less close together, and it may be described as being traversed throughout by minute pores filled with water. The finer the clay particles, the smaller and the more numerous the pores. Thus, the purer a clay and the finer its particles, the more porous it is.

POROSITY AND PERMEABILITY.

At first sight this seems contrary to experience, but it is necessary further to explain that porosity must be distinguished from permeability. The finer the pores in clay, the more difficult it is for water to pass through them, because of the great resistance which the surface tension of water exerts at the ends of fine tubes. One can test this in a simple manner with fine glass tubes. Take a tube with a bore, say, of one-eighth of an inch, and see with what ease one can suck up water into it, and expel it again. Now try the same with a broken thermometer tube and the difficulty or impossibility of doing it will be at once apparent. A proof that strong clays are actually more porous than sandy ones, is found in the fact that they take a larger percentage of water of manufacture to make them sufficiently plastic for moulding.

In spite of the smallness of the pores, heat is able to act on the surfaces of the water in the tubes, causing evaporation. Capillary action then commences, and the internal water moves through the pores towards the surface.

The properties, then, of a pure clay, are porosity and impermeability. Now, as sand or other particles are mixed with clay, so the porosity decreases, and the permeability increases, the relative difference depending on the proportion, shape, and size of the particles. The greatest permeability and least porosity are found in clay containing large particles of irregular shape. The projections on the particles catch against one another, preventing contraction of the mass of the earth. The pure clay is not sufficient in quantity to fill completely the spaces between the particles, thus leaving comparatively large channels through which water can pass. The channels are, nevertheless, much fewer in number and less in total volume than the pores in a strong clay.

Physical Phenomena in the Drying Process.

The process of drying clays when made into bricks, varies with these qualities of porosity and permeability. When drying a porous strong clay, the water at first evaporates from the surface and is replaced by capillary action from the interior, the brick contracting by the same amount as the water diminishes. The pores remain all filled with water until the rate of evaporation exceeds the rate at which the pores transmit the water. This point occurs when the clay particles move so much less freely on each other, that the rate of evaporation exceeds in volume the rate of contraction. After the first stage of surface-drying, the exterior of the brick loses water more rapidly than the interior. In the second stage now reached, the pores are no longer filled with water at their outer ends, and begin to form spaces in the brick, filled with air and vapour. Contraction still occurs throughout this second stage until the substance of the clay is so far solidified that the individual particles can no longer slip on each other at all. The third stage is then reached, and capillary action and shrinkage cease entirely. Evaporation now takes place entirely inside the brick, and spaces are formed exactly corresponding with the volume of water lost.

Scumming in Drying.

In a strong clay, the long duration of the first stage and its accompanying capillary action is the cause of the scumming which occurs in drying. The soluble salts in the clay are held in solution by the water, and are deposited on the surface by it as it evaporates. If the surface-drying is of short duration, the salt deposited is almost inappreciable, but the longer the duration the more the deposit. Excess of water on the surface of the brick caused by the lubrication of a machine die or a coating of oil, will increase the duration of surface-drying. The effect is frequently illustrated by the marks of workmen's oily fingers seen on strong clay bricks after burning. The coating of oil has lengthened the duration of surface-drying where the fingers have touched the brick. In firing in the kiln, the soluble salts are largely converted into insoluble ones by combination with the silica of the clay, or by combination with the sulphur in the coal and the alumina of the clay.

Means of Diminishing Scumming.

This form of scumming can be diminished, if not altogether prevented, in several ways, and it would perhaps be of value to mention them at this point.

By sanding the surface of the brick a greatly increased evaporation can be obtained in the first stage from the actual surface itself. The effect of this is to form a very thin skin of drier clay through the many interstices of which the evaporation of the first stage is completed. The salts, instead of being deposited outside on the face, are left for the greater part just below this skin, and are not seen.

By a rapid evaporation in the earlier part of the first stage of drying a similar effect may be produced.

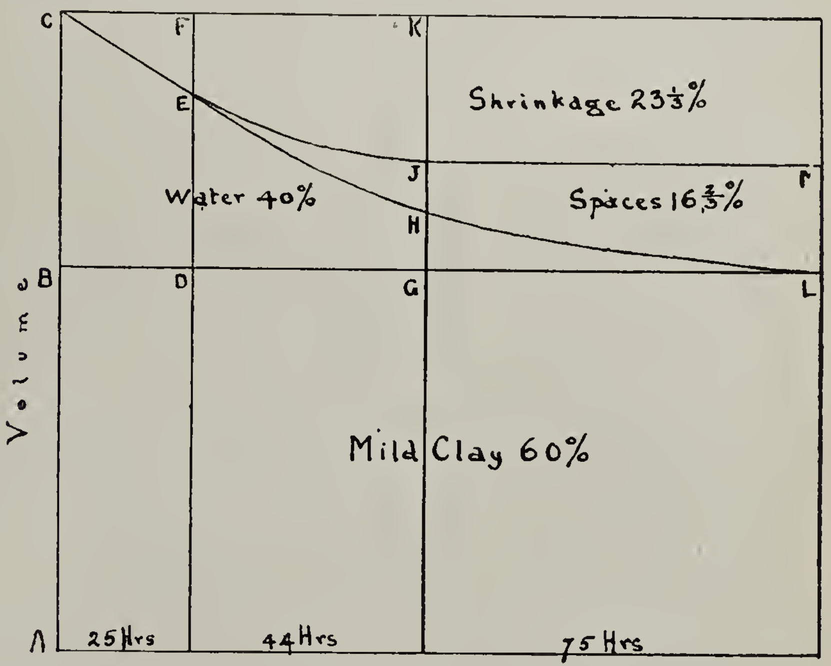


Fig 3.

By applying a thin coating of flour paste, which is very porous, the deposit of salts in drying is formed on the surface of the paste instead of on the clay. When fired, the salts are not in sufficiently close contact with the clay to enter into combination with it, and can be brushed or washed off. The flour, of course, is burned away in the kiln.

By washing or painting the faces with a slip of the same clay, when the brick is dry or half dry, an effect is produced which needs no explanation. It is a process largely in use in the manufacture of architectural terra-cotta.

By the admixture of a certain proportion of carbonate of baryta with the clay when pugging, an insoluble compound is formed with such soluble sulphates as are present, and this consequently remains in the body of the brick. This process has no effect on soluble nitrates and chlorides, which may be present in the clay, and is, therefore, only a partial remedy depending on the salts present. It is well to have an analysis of the clay before trying this remedy.

Returning now to the consideration of the physical phenomena of drying, it is evident that the same three stages are operative in the case of a brick made of permeable, sandy clay. The first stage is, however, much shorter in proportion, for three reasons:—A smaller proportion of water of manufacture is added to the clay, capillary action is less operative in the larger spaces between the particles, and the evaporation is more rapid in proportion to the shrinkage. The danger of scumming is consequently much reduced, but even with these clays it occurs frequently in the damp, cold weather of late autumn, in out-door drying.

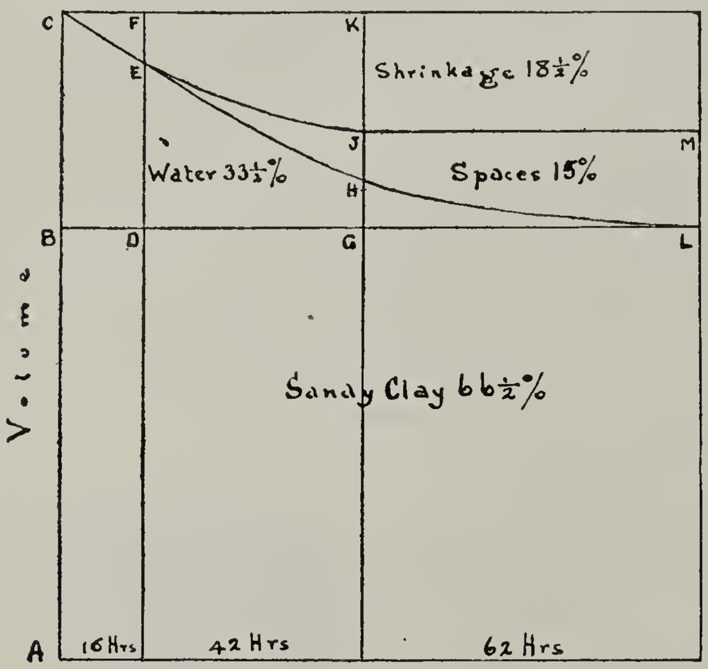


Fig 4.

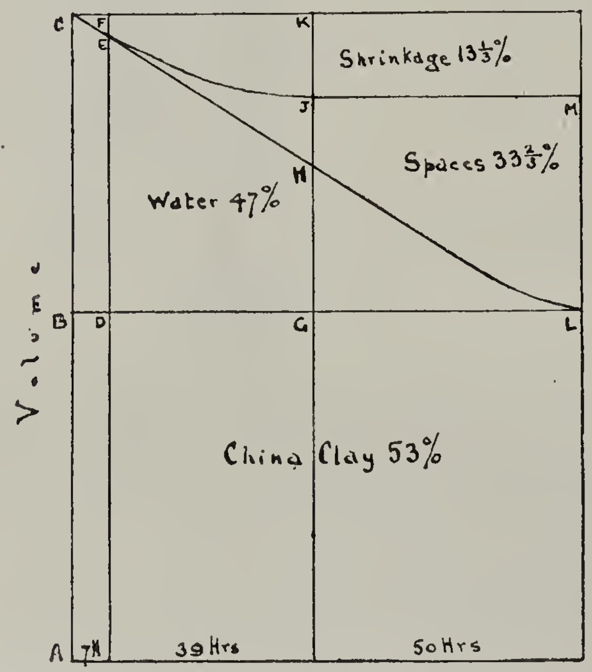


Fig 5.

DIAGRAMS OF BRICK DRYING.

Experiments on many samples of clays give figures bearing out the preceding statements, and graphic representations of results as shown in diagrams are obtained.

In these figures the vertical lines represent volumes and indicate volume of clay, water, spaces and shrinkage of a brick at different stages. Each figure is divided by its vertical lines into the three stages of drying before described. The extent of the horizontal line represents time in drying. The samples of clays were all subjected to the same conditions while being dried, and were weighed and measured at intervals. In each figure *a b* is the volume of clay, and *b c* the water at the commencement. At the end of the first stage, taking *b d* hours, the volume of water remaining in the brick is *d e*, and the shrinkage in volume is *e f*.

At the end of the second stage, taking *d g* hours, the volume of water is reduced to *g h*, and the shrinkage (now complete) is *j k*. It is consequently evident that there is a volume *h j* of spaces in the brick. At the end of the third stage, which is reached in *g l* hours, the water is gone, and as the brick has not shrunk further, the volume of spaces in the brick must be *l m*. These diagrams (Figs. 2, 3, and 4,) bring into prominence the variations obtaining as the clay is more and more sandy, showing the decrease, (1) in the time of drying, especially in the first two stages; (2) in the water necessary for manufacture; (3) in the shrinkage; and (4) in the spaces in the dry brick. Fig. 5, representing the results obtained with china clay dried under the same conditions, is interesting, as it shows the difference in character between plastic earths and kaolins. Here the first stage is very short, the water of manufacture is large, the drying is quick, the shrinkage is small, and the spaces considerable in volume in the dry clay.

THE MAGNETIC QUALITIES OF BRICKS.

MESSRS. O. A. GAGE and H. E. Lawrence contribute to the *Physical Review* the results of their experiments on the magnetic qualities of building bricks. The authors selected thirty-two different qualities of bricks and ascertained their magnetic properties by means of an end-on magnetometer, constructed for the purpose. The centre of the brick is placed at a distance of about 6in. from the magnetometer needle. The positions of the magnetic poles in the bricks were found approximately by presenting the different faces in turn to the magnetometer. The two opposite faces causing the greatest deflections were then considered to contain the magnetic poles. In all cases these were found to be either in the faces or edges and never in the ends of the bricks. The position of the poles was permanent, and could not be changed by any means at the author's disposal. It was found, however, that the deflection varied with time. With the magnetometer used by the authors the magnetic moment of the bricks experimented with varied from zero up to 2·47, while 0·5 represents a fair average of the bricks displaying magnetic properties. Of course, the magnetic moment, by its determination in this way, and not being expressed in C.G.S. units, does not convey much to the mind, but it was found that the brick having the above mean moment was equivalent to a steel magnet 3·53mm. in length with ·0325 C.G.S. unit to the cubic millimetre. The permeability of the bricks was found to be practically negligible. The authors consider, however, that the greater part of the magnetism is due to the presence of iron oxide in the bricks, as they found that the magnetic moment varied roughly with the quantity of this oxide in the clay. They explain the fact that the permanent magnetism is never found with its poles at the ends of the bricks, on the assumption that the magnetism is due to the cooling of the bricks in the magnetic field of the earth. The bricks when placed in the kilns are almost always either on an edge or a face, allowing the magnetic field of the earth to pass either through both or faces both edges.

THE FUEL QUESTION.

In view of the increasing price of coal and the ultimate exhaustion of our coal resources, a correspondent of the *Glasgow Herald* asks whether we have any other material in these islands that can be utilised for fuel, which will answer all the purposes for which coal is now used, give equally good results, and be as cheaply produced. Now, so far as is known (continues the writer), the only other substance to be found in great Britain and Ireland in large quantities—which will give the same results as coal, and in some cases superior—is peat, and in the United Kingdom there are about six millions of acres which at present are practically worthless. Ireland alone has an area of some 2,830,000 acres of the finest peat bogs in the world, which, if properly treated, would prove a source of immense wealth to that country. The question of the utilisation of these vast peat lands has long occupied the attention of engineers and the scientific world generally, but hitherto success has not crowned their efforts, for the reason that up to the present time it cannot be converted quickly into a fuel equal to coal in sufficiently large quantities, and at a cost that will pay. What, then, are the difficulties that have been encountered ? The first is that the peat cannot be quickly and cheaply dried ; hitherto all attempts to attain this end have failed ; the second difficulty is to produce the fuel in such a condensed form, not compressed, which has proved a failure, for reasons that will be given further on, as will enable it to take the place of coal, and contain the same calorific units of heat. Peat, as is well known, when dug from the bog contains 70 to 80 per cent. of water ; therefore, to get rid of this large amount of moisture in the cheapest and most expeditious manner, without cracking the blocks, and at the same time producing a hard, heavy condensed fuel at a moderate cost, is the enigma that has to be solved. At this point a short account of a few of the various efforts that have been made to turn our bog lands to account, and the many uses for which peat has been tried and found useful, may be of interest. It has been found that to produce the fuel in a hard, heavy and condensed form the peat, after it has been dug from the bog, must be thoroughly desiccated or pulped in a suitable mill, in order that the fibres or tubes which permeate it, and are filled with water, may be completely cut to pieces, as these fibres or tubes, if not completely destroyed, continue to hold the water, which turns to steam or air in the drying, and therefore burst, thus causing the blocks of fuel to crack and fall to pieces. This is the reason why "compressing" peat has failed, because no matter how much it is pressed, immediately the pressure is withdrawn the fibres resume their natural size, again absorb some of the water remaining in the peat, and explode and crack the blocks when drying. The mastication or pulping in the mill not only facilitates the drying, but causes the peat to "condense" naturally and to become very hard and heavy. Taken bulk for bulk, "condensed" peat is about four times heavier than if simply dug from the bog and air-dried. It then resembles coal, and it is therefore into this "consolidated" state that it must be brought in order that it may have the same power as coal. Peat can also be converted into a very high-class charcoal, equal, if not superior, to that obtained from wood. It has long been known on the Continent as a fuel free from phosphorus and sulphur, and is there used in the smelting of iron and steel. The metal so produced is very fine, and commands high prices. The charcoal is also very useful for carbon for electrical purposes, and is excellent for the manufacture of carbide calcium, which is used for generating acetylene gas. Thus peat, whether in its "condensed" or "charcoal" form, has been found by practical test and theoretical calculations to answer all purposes where great heat and purity of fuel are required. When peat was first used as a fuel we have no means of telling. In 1849 a Mr. Rees Rice took out a patent for the utilisation of peat, and works were erected at Athy, in Kildare, Ireland, for the purpose of distilling and obtaining the useful bye-products from it. The idea was derived from the application of inflammable gases for heating purposes, which were to utilise inferior coal and other combustibles by converting them into gases, and obtaining the various products contained in them. From peat there may be obtained by distillation pyroligneous acid, a brown empyreumatic, crystallisable oil from which paraffin, ammonia and other chemicals may be extracted. Many experiments have been made with peat. The late Duke of Sutherland spent considerable sums in endeavouring to utilise the peat bogs on his estates. Sir John Ashley, we believe, started works on Dartmoor, and more recently Lord Malcolm of Poltalloch has also experimented ; but the cost of production was too great, nor could the fuel be dried quickly. The largest experiment that has been made in recent years was at Horwich, near Bolton, in Lancashire, where there is a bog of very fine peat of great depth called the Red Moss. The works were established in 1863 to work a patent of the late William H. Buckland. They were erected at a cost of £120,000, and not only contained the machinery to produce condensed peat and ovens to convert it into charcoal, but a small blast furnace was also built capable of turning out 80 tons of charcoal pig iron per week. These works were carried on for some years ; the iron produced was of a very high class, and was made entirely from British ores. Those who used the metal pronounced it to be far superior to any smelted with coal or coke. It was also proved at the Horwich works that iron of a high class could be made by using the condensed peat blocks as a fuel once the supply of charcoal failed, and to keep the furnace going condensed peat was used, with the result that a fine iron was produced. This company had the same trouble as all the others, viz., they could not dry quickly and cheaply, although the fuel they produced was of excellent quality. In the conversion of one ton of condensed peat into charcoal 13,000 to 14,000 cubic feet of gas free from sulphur is produced of a high heating and illuminating power. The late Dr. Versman, consulting chemist to the Commercial Gas Company, of London, to whom a sample of the condensed peat produced at Horwich was submitted, stated "That a ton of the peat, the specific gravity of which was 810, and containing 9·3 per cent. of moisture, yielded 13,160 cubic feet of gas, equal to sixteen and a-half sperm candles." He adds—"The only true obstacles which I could find against the permanent application of peat for gas purposes are completely removed by this condensed fuel, which in a simple and most efficient manner produces a peat containing considerably less moisture than coal ; and the charcoal obtained from it is of the most dense and compact nature, resembling wood charcoal in its properties. I therefore consider the process of the utmost importance, and that at no distant time it will considerably influence the art of gas-making. By the introduction of condensed peat into gas works a very considerable saving must be effected." Condensed peat has also another advantage over coal, as it is practically smokeless and contains less ash. The following table will show the average quantity of ash from coals from different localities :—

Wales	4·91
Newcastle	3·77
Lancashire	4·88
Scotland	4·63
Derbyshire	2·65

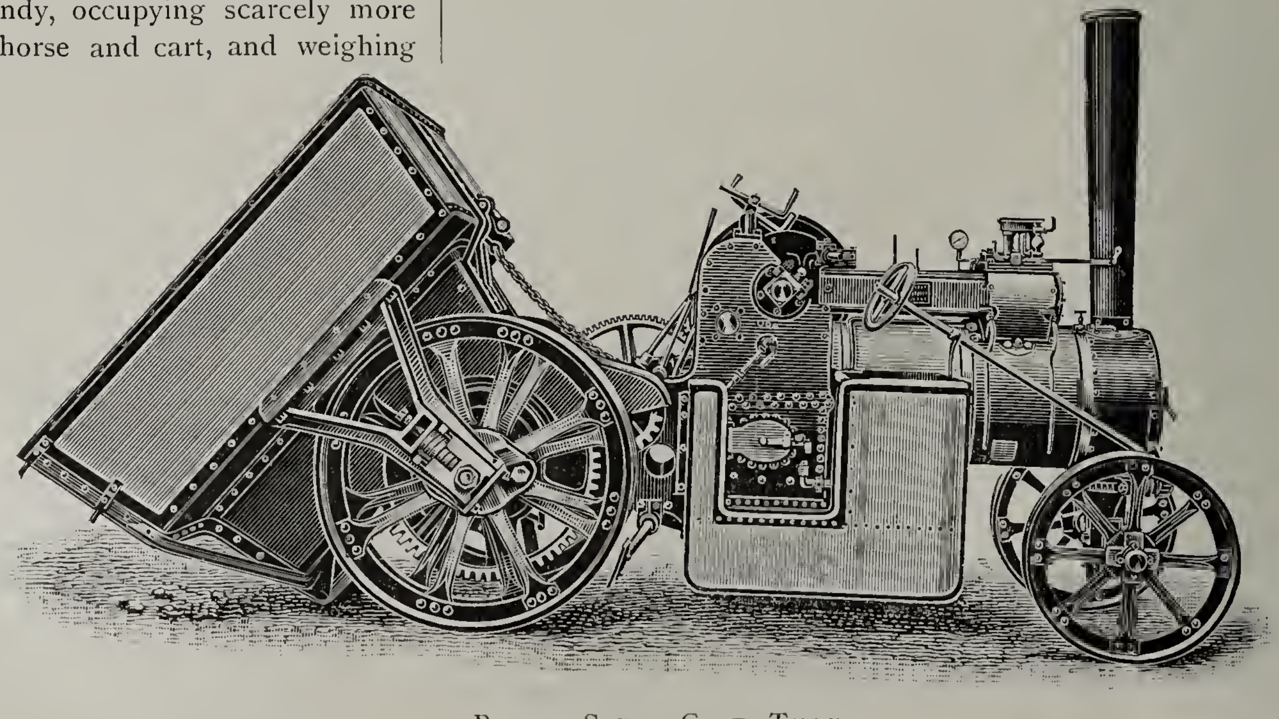
The ash contained in twenty-seven varieties of peat gave a mean average of 2·62, which is less than the coal obtained from any of these districts. The absence of smoke is also a great point in its favour; but even when mixed with coal in certain proportions it entirely does away with the dense black clouds which are so obnoxious in our cities, and for the creating of which nuisance our owners of steam power so often get fined. At a recent trial on a steamer where the fuel was used mixed with coal, there was an entire absence of black smoke, the speed was seventeen to eighteen knots, and steam was kept up well. The fuel has also been thoroughly tested on locomotives, and found to answer all the purposes required. On an express train where the peat was mixed with coal there was no black smoke. Although the coal used was of an inferior quality there was plenty of steam and the consumption was 31·4 lb. to the mile. If we compare pig iron that has been made from the same ore, the one smelted with coke and the other with peat charcoal, a marked difference will be observed. Cleveland ore was taken and smelted into No. 3 Clarence with coke, while another parcel was smelted with peat charcoal:—

Coke.		Peat charcoal.	
Carbon ...	... 3·41	Carbon ...	... 0·043
Silicon ...	... 2·73	Silicon ...	... 0·199
Manganese	... 0·37	Sulphur ...	... Trace
Sulphur ...	... 0·17	Phosphorus	... 0·031
Phosphorus	... 1·23	Manganese	... 0·158
Titanium ...	... 0·14	Titanium...	... —
Iron... ...	... 93·66	Iron ...	... 98·571

Thus it will be seen that peat, when properly prepared, is quite equal to coal for all purposes. To make it a commercial success, the peat, after it is dug from the bog and placed in the pulping mills, should not be handled again until it comes from the drying machine in a perfectly hard and condensed state, which operation must not take more than ten hours. The fuel should then be ready for either burning or converting into charcoal.

A PATENT STEAM CART.

We are glad to see that Messrs. Pullan & Mann have introduced a special cart for the conveyance of bricks, etc. There is no doubt that the motor car in some form or other is rapidly displacing the older form of leading by horses, to the saving of the user. The cart in question, of which we give an illustration, is compact and handy, occupying scarcely more room than would an ordinary horse and cart, and weighing under 4 tons. Having in view the wear and tear on roads, it is made with wide smooth shod wheels which also gives it an advantage on soft ground. It is specially constructed to pull heavy loads, while the consumption of fuel is small. The cart comes under the Motor Car Act, which dispenses with a flag carrier, as in the case of traction engines. We shall be surprised if this cart is not adopted in many brickyards where much carting has to be done.



Patent Steam Cart, Tipped.

QUERIES AND REPLIES

Fire-clay Working. — *Will you kindly inform me through your columns how fire-clay that has been weathered is made up by machinery? Clay that is exposed to the weather gets damp, and my experience is that it clogs in the machine.*

All clays are improved by weathering, and they naturally get damp in the process. Some clays take up water more readily than others, fire-clays in particular. Strictly speaking, the clay should be dried, ground, and sifted; it shonld then be soaked down, mixed and pugged, to the consistence required—this may be soft, medium, or stiff, as occasion demands. But the amount of time spent on the preparation of one's material, turns upon the nature, quality, and selling price, of the manufactured wares. Much also depends on the plasticity of the clay, and on the moisture present in the mass, in the fabrication of wares by machinery. However, the means for correction lie ready at hand. It may be by the addition of a dissimilar clay, sand, rough stuff, or ground and sifted burnt clay, in quantity and size suitable for the work. Or the whole question may turn on the moisture present, or on some small detail in the mechanical manipulation of the material. Clayworking operations are always more amenable to local rather than general treatment. A little direct experiment on the spot will be found of far greater value than any outside advice that could be given, particularly that given at a distance, without any possibility of knowing all the circumstances of the case.

J. Oakes.—*Please send address.*

SPECIFICATIONS ACCEPTED.

25,943. (1898). J. Webb, Richmond, Surrey. Improved Method of Protecting or Packing Glazed and other Bricks.

27,156. (1898). G. C. Leslie, Anerley, S.E. Apparatus for Consuming Smoke and Fumes from Chimneys.

1,756. (1899). Preston Davies, Surrey. Improvements in Drying Apparatus for use in Manufacture of Portland Cement.

2,128. (1899). B. Robinson, Derby. Improvements in Machines for making Bricks, Tiles, &c.

2,921. (1899). F. A. R. Neill, St. Helens, Lancashire. Improvements in Manufacture of Bricks, &c.

APPLICATIONS FOR PATENTS.

24,812. E. Reese. Improvements in connection with the Manufacture of Blocks and Slabs from Granite, Slate, and like refuse.
24,949. R. B. Ransford. Improvements in Tiled Roofs.
24,950. Ditto. Ditto Roofing and Wall Covering Tiles.
25,026. H. Alexander. Improved Mechanism for Feeding Material to a Brickmaking Press.
25,089. A. H. Beasley and others. Improved Hack-Cap, for use in Brickworks.
25,259. J. Holroyd and Robert Bond. Improvements in Bricks for Building purposes.
25,277 T. Whalley. Improvements in Brick and Tile Dies.
25,540 T. C. Fawcett, Limited. Improvements in Brickmaking Machinery.

THE WORKMEN'S COMPENSATION ACT, 1897.

THE DANGERS OF BLASTING.

While Michael Kelly, living at 58, George Street, Paisley, and John Stevenson, Walkers' Land, Elderslie, both miners, were employed in blasting operations in the pit of Ferguslie Fireclay Works, Paisley, owned by Robert Brown and Son, the shot prematurely exploded, and Kelly was severely burned about the head and face; Stevenson being also burned on the face. Kelly was removed to the Infirmary.

A SLIP.

William Searle, about 35 years of age, employed at Saxon Brick Company, Whittlesey, has been admitted to Peterboro' Infirmary suffering from serious injuries. He was wheeling a barrow up a stage when he slipped on the snow and fell on to a heap of bricks, a distance of about 15 feet, the barrow coming down on him. His left eye had to be removed, and he sustained further serious injuries to his head.

FELL INTO THE MACHINERY.

On Christmas afternoon a labourer, named Francis Heyburn, residing in Williamsburgh, met with horrible injuries in the Ralston Brickworks, Hillington, Glasgow Road. It appears that Heyburn had been at work in one of the sheds, when he accidentally fell amongst some revolving machinery, and before the engines could be stopped he was badly mangled. He was at once conveyed to the infirmary, where it was found that besides being severely bruised the unfortunate man was suffering from internal injuries of a serious nature.

THE LAW.

A Brick-making Machine Action.—On December 13th, Mr. Justice Grantham gave judgment in the action brought by Messrs. William Johnson and Sons, of Castleton Foundry, Armley, makers of brick-making machinery, against the New Malden Potteries and Brickworks Limited, to recover £413 16s. 9d. for a machine supplied and work done. Defendants counter-claimed for damages for non-performance of contract.—In delivering judgment, his Lordship said the case was full of difficulties of fact and law, but both parties had given their evidence honestly and honourably. He found for plaintiff for £413 10s. the amount claimed, less £68 12s. 6d. cost of mending and of a new shaft.—On the application of Mr. Tindal Atkinson, a stay of execution was granted, defendant undertaking to bring the amount awarded to Court.—The counter-claim was dismissed.

Heavy Fine for non-Fencing of Machinery.—A case of considerable importance, inasmuch as it was the first of its kind to come before the bench, was heard at Chester Castle, when Albert Payne, occupier of brickworks at Stanley Road, Ellesmere Port, was summoned for not keeping the same in conformity with the statute in that he failed to fence securely the fly wheel and every part of a steam engine therein, by which he had rendered himself liable to a penalty of £10.—Sydney Eraut, one of her Majesty's inspectors of factories, said that on the 21st November he found the engine room entirely unfenced. The machinery had been working that morning, but was not then working as it was dinner hour. There were no guards whatever. He had visited the factory previously on the 2nd March, and had then warned the manager, and gave him precise instructions as to the carrying out of the fencing, but nothing had been done. It was a dangerous thing to leave an engine unfenced, and as it had been going on for so long he must ask for the infliction of a substantial penalty.—Mr. Payne's manager appeared on his behalf, and said that owing to an important engagement he was unable to attend, but he was authorised to admit the offence, which he regretted, but the matter had since been attended to. He resided in Warrington, and left everything to his manager, who had neglected to have the machinery fenced; he had been dismissed for not acquainting Mr. Payne about the matter, and witness had only been appointed since the offence was committed.—The bench considered it a bad case, and imposed a penalty of £5 and costs.

A "Patent" Brick Experiment.—Experiments in brickmaking have brought to grief Henry Guttridge and Charles Guttridge, two brothers, who were recently in business together as "The Ironstone Brickworks," in Ditchling Road, Brighton. Henry Guttridge, who had returned his liabilities at £4,051, and his assets at £46, was first questioned at a recent examination by the Official Receiver. He said that he first started his business about three years ago. He had then a capital of £20, and he afterwards brought in another £60 by selling a greengrocery business which he had at West Brighton. He began the joint business by experimenting on a patent he had, his mother advancing money for the experiments. At the present time he owed his mother over £4,000, exclusive of the money she had paid for the land. He could not exactly say how the money which he owed to his mother had been made up. He had assigned his patent to his mother but he did not know when. Further examined, Henry Guttridge said he did not know of his insolvency till the fire last summer. He attributed his failure principally to the fire and to the failure of a machine he had for making his bricks. He started with the machine in October, 1898, and it was "a continuation of breakdowns." The bricks, and not the machine, were the subject of the patent. The machine, debtor was understood to say, was the first of its kind that had come out, and he had had it because the inventor's brother had advised him to do so. The machine had cost him originally £325, of which he had paid off £250, but it had cost him hundreds of pounds in repairs. In November, 1898, debtor said that his liabilities exceeded his assets by £3,000. The debtor said he had several applications to purchase his business and patent in answer to advertisements. The applicants had offered him various sums, from £25,000 to £5,000. "Do you still believe in the patent?" asked the Registrar. "Well, if the machine worked," said Guttridge. He had not, he said, been insured against the fire which had so damaged his business. He had never got out a statement showing his position. He believed that his patent was at present worth at least £1,000. A creditor present in Court addressed the Registrar, and seemed to think that if property put on the brickmaking market it might realise a very considerable sum in excess of this figure, some £5,000 or £6,000, in fact. The Registrar: I am sure Mr. Saville will be very glad of any hints as to how to dispose of the patent. The Official Receiver: Yes; they are awkward things to dispose of. (Laughter.) Questioned by a Mr. Ward, who represented the firm who made the brick-making machine, the debtor answered, amid some laughter, that he had started his greengrocery business in order to "raise his position in life," he having been originally "a carpenter on the South-Eastern." Replying to Mr. Plumbridge, he said that the man who put up his brick-making machine was with him for three months fitting it up, and the longest time it had ever run was a fortnight. The patent bricks were made from dust refuse, and he had orders for as many bricks as he could make, if the machine would only have run all right.

A Clay Lease. — Hexter v. Pearce.—This was an action for specific performance as to the raising of clay. Mr. Warmington, Q.C., and Mr. Badcock, Q.C., appeared for the plaintiffs ; Mr. Vernon Smith, Q.C., and Mr. Ward Coldridge for the defendants and Mr. and Mrs. Pearce ; and Mr. T. L. Wilkinson for the other defendant. The defendant, Mr. P. W. Pearce, is the owner in fee simple of an undivided moiety of certain lands, in all about 50 acres, near Teignbridge, in the County of Devon, and the defendant, Mrs. Pearce, is entitled to, an annuity charged upon the said moiety. The plaintiffs, Messrs. Hexter and Humpherson, are pottery manufacturers carrying on business at Kingsteignton, in the same county. On May 11th, 1896. the defendants, Mr. and Mrs. Pearce, agreed with the plaintiffs to grant them a lease of the clay and other minerals in or upon Mr. Pearce's moiety of the said lands as from the termination of the existing lease held by the other defendant, Mr. W. H. W. Wilkinson. In September, 1898, Mr. and Mrs. Pearce refused to grant a lease to the plaintiffs, who now claimed specific performance of the agreement of May 11th, 1896. In April, 1894, and in March, 1898, leases were granted to the defendant Wilkinson by all the persons in whom the said lands vested in undivided shares, giving him the right to raise merchantable potter's clay (with certain defined restrictions) from the said lands.—Mr. Warmington, for the plaintiffs, said that there was no case which laid it down that specific performance could not be decreed of an agreement affecting an undivided moiety of lands, though, on the other hand, there was no reported case in which specific performance of such an agreement as the present had been decreed. "Burrow *v.* Scammell" (18 Ch. D., 175), however, was a somewhat similar case, and "Porter *v.* Lopes" (7 Ch. D., 358) might also be cited. The general rule was that unless specific performance was impracticable or would involve great hardship, it should be granted ; and there was nothing in the present case to take it out of the general rule. The plaintiffs and Mr. Wilkinson could easily arrange a working agreement, and it must be presumed that they would act as reasonable men. Even if inconvenience should result, and he did not see why it should, that would not be sufficient to debar specific performance.—Mr. Vernon Smith, for the defendants, Mr. and Mrs. Pearce, argued that the Court should not grant specific performance of a contract when the result would be great inconvenience to the parties interested. The remedy in the present case should be damages. The result of specific performance would probably be a partition action and the appointment of a receiver, and the Court should hesitate before making a decree that might lead to further litigation. He relied on what was said in Price *v.* Griffiths" (1 de G., McN., and G., 86).—Mr. Wilkinson followed on the same side. The evidence was to the effect that there were about three-and-a-half acres of merchantable clay left.—Mr. Justice Farwell, in delivering judgment, said that the question was whether be should grant specific performance or merely award damages. Though the evidence had been somewhat conflicting, it was clear that it would not be impracticable for both the plaintiffs and the defendant Wilkinson to work the clay that was left under the land. Apart from the question of impracticability, either misconduct or great hardship was necessary in order to take away the right to specific performance. There was no direct authority on the point—"Price *v.* Griffiths" being clearly distinguishable—but it would be a strong thing to lay it down that specific performance could not be granted merely because the contract was concerned with an undivided moiety of lands. Whether the results of the contract would be inconvenient or not was a matter for the parties to consider when entering into it. He would, therefore, decree specific performance of the agreement.

A Smoke Case Dismissed.—The Attercliffe Brick Company, Limited, were summoned at the instance of the Sheffield Corporation, charged with permitting a smoke nuisance. Mr. W. Collingwood prosecuted, and Mr. A. Neal appeared for the defendants.—Mr. Collingwood explained that the defendants had been having their machinery driven by a portable engine. On October 7th, Inspector Rich made an observation, and found that black smoke was emitted for 16 minutes in an hour. A notice was served on the defendants, requiring them to abate the nuisance. Subsequent observations were made, and emissions of $10\frac{1}{2}$ and 13 minutes' dense smoke were recorded. It appeared, he said, as though the portable engine had been bought because the firm had had an order made against them for causing excessive black smoke from a Lancashire boiler. He asked for an order for the nuisance to be abated.—Inspector Rich stated that he made several observations, and on October 7th black smoke was emitted for 16 minutes in one hour, on October 25th, for $6\frac{1}{2}$ and $2\frac{1}{2}$ minutes, on November 2nd, for $10\frac{1}{2}$ minutes, and on November 6th, for 13 minutes on two occasions.—In answer to questions put by Mr. Neal, witness said the portable engine had been stopped, and a new engine, chimney, and Lancashire boiler had been added, but the manager had told him that the former might be used during the winter.—Inspector Nicholson said that the new machinery would not be sufficient to deal with the heavy work.—Mr. Neal contended that the summons ought to be dismissed, because before an order was made the magistrates had to be satisfied that the nuisance was likely to recur. The firm had done all that they could to meet the wishes of the Corporation. They had been told that the chimney from the boiler was not high enough, and had given instructions for it to be made higher, but it was found to be impossible to do that because the chimney had been burnt. They used the portable engine to carry on the work until fresh appliances could be obtained. The last day complained of was the day before the new engine was brought into use, and the portable engine had not been used since.—The magistrates dismissed the case.

"Subbing" in the Potting Trade.—At the Longton Police Court on Jan. 3rd, James Broadhurst & Sons, earthenware manufacturers, of Fenton, sought to recover, under the Employers and Workmen Act, £3 16s. from William Bourne, of Sutherland Street, Fenton, because the latter had left his work without giving notice, and without just cause. Mr. E. L. Young appeared for the complainants, and Mr. F. Collis for the defendant. The complainants' case was that the defendant on November 21st left without notice. The firm could not get another man for a fortnight, and consequently they suffered considerable loss. There was a custom amongst potters to "sub" their wages in advance. The men were paid on the work which came out good from the ovens. An estimate of their work was taken when the ware was in the green state. Money was advanced to the men, and the account was balanced when the ware came from the oven. Since September last the defendant had at various times received money in advance on ware in the green state, amounting in all to £4 11s. 3d. When he left them the complainants had to get help at the cost of 10s. 10d. to do work which should have been done by the defendant. When the ware was returned from the ovens it was found there was £1 5s. 10d. due to the defendant, and deducting that amount from the sum the defendant owed the firm and the cost of obtaining extra men to do the work which should have been done by the defendant, it left a balance due to the firm of £3 16s. 3d.—The defence was that Bourne when he applied for a situation was asked by Mr. Broadhurst if he would take a certain jigger with which there had been trouble. The defendant agreed, the arrangement being that he should be allowed to leave if the jigger did not work satisfactorily. After trying the machine for a month the defendant found he could not make it pay. He told the manager, and as soon as he had found another situation left, as he had a right to do under the arrangement he made with Mr. Broadhurst.—The Stipendiary Magistrate (Mr. Harold Wright) said that although he had no

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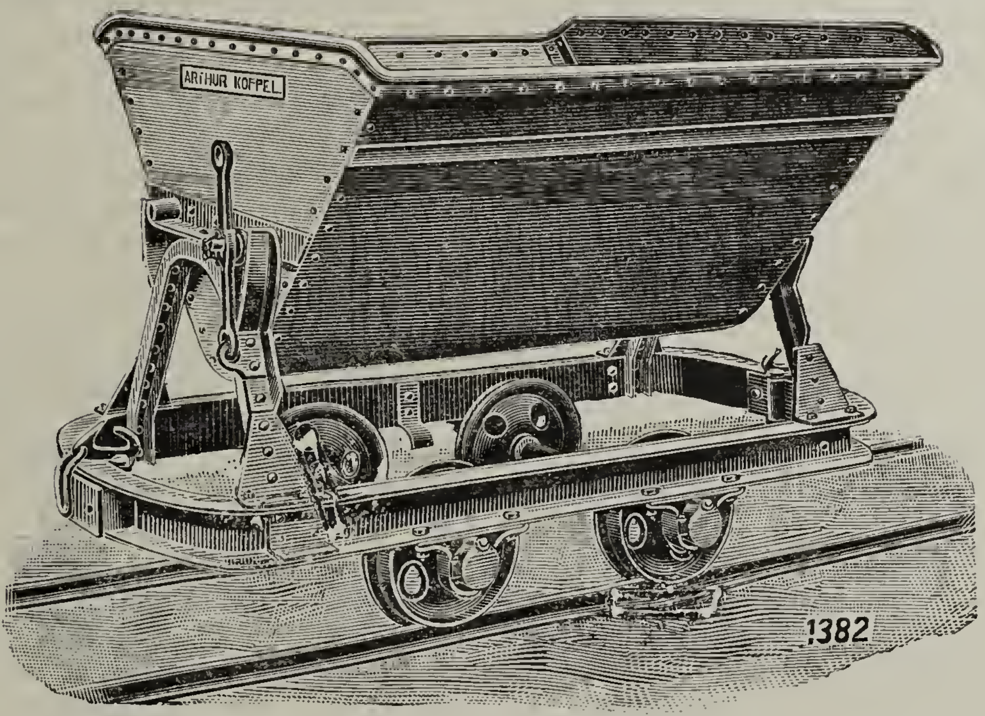

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practical knowledge of the potting industry he would like to offer some suggestions for consideration. The "subbing" system seemed to him extraordinary, and one which must lead to improvidence on the part of the workmen. In this case the "subbing" had extended over three months, and under such circumstances a man might easily believe he was earning larger wages than was really the case. The average advance to the defendant was 30s. a week, and when the accounts were balanced it was found that he was entitled to only an average of 23s. a week. The results of such a system were two-fold—firstly, improvidence on the part of the workman, who thought he was earning more than was actually the case; and secondly, the power it gave the master over his workmen. The men received money in excess of their earnings, and in many cases it was impossible for the men to balance the account. The system in his opinion was absolutely unjust and unfair between one man and another. He did not know the difficulties of the trade with regard to the systems of paying good from oven and good from hand. Some firms paid one way and some the other. It seemed to him that if they paid good from hand they, at any rate, got over the difficulty of "subbing." He did not know whether it was possible always to pay good from hand; probably it was, and one could only hope the system would soon become general. The sooner "subbing" was done away with the better. The present case was practically undefended, and there would be a verdict for the amount claimed.

A Question of Rents and Royalties.—The case of the South Staffordshire Blue Brick Company, Limited, *v.* the Rowley Station Colliery Company, Limited, came before Mr. Justice Farwell, sitting in the Chancery Division. Mr. Bramwell Davis, Q.C., and Mr. Wood Hill appeared for the plaintiffs, and Mr. A. T. Lawrence, Q.C., and Mr. Parker for the defendants. — Mr. Bramwell Davis said the action was brought by the plaintiffs, who were the present owners of certain way-leaves and rents, payable under a lease of December 30th, 1876, for a declaration against the defendants that the plaintiffs were entitled to receive the whole of the minimum rent, etc., additional royalties payable under that lease, and were not subject to a certain memorandum reducing those royalties by half, to which they were not parties, and which were executed by a person who was not interested, but who had been interested in an equity of redemption, and of whom it might be said he was only the nominee in the matter. On December 30th, 1876, these way-leaves and rents were entered into between the defendants and Mr. Samuel King Church and Mr. Albert Milstead. Certain lands at Cakemore, Halesowen, were let to the defendants for the construction of a tramway from the Rowley Station Colliery to the Tetford branch of the Birmingham Canal. The minimum rent was to be £100 a year, with an additional royalty of a penny per ton for all coal carried over the tramway over 24,000 tons. On the 21st December, 1877, Mr. King Church and Mr. Milstead mortgaged the property, including the siding of the tramway, to the trustees of the National Provident Institution. These people sold the property to the present plaintiffs on the 29th of June, 1894, and the plaintiffs became as from that date entitled to the benefit of the rent and royalties. The defendants alleged that about 9th February, 1889, an agreement was made with Mr. S. King Church, to whom Milstead's interest had been conveyed, and the defendants to reduce the rents and royalties payable under the agreement to one-half of the original amount, and the defendants contended that such agreement was binding on the plaintiffs. Thus some sort of estoppel was set up by this claim, but he thought his lordship would come to the conclusion that the onus of showing this was on the defendant.—His Lordship said the curious thing about the case was that this memorandum never seemed to have been seen by the mortgagees, and it was only found recently by a solicitor. Taking the whole of the circumstances into consideration, he came to the conclusion that the plaintiffs were entitled to his judgment, and there would, therefore, be an order for the declaration in the terms asked for, and an enquiry into the amount of arrears due by the defendants.

COMPANIES' MEETINGS.

Dublin Brick and Tile Company, Limited.—The ordinary general meeting of the Dublin Brick and Tile Company, Limited, was held at the offices of the company, Beresford Place, on Friday, the 22nd ult. The statement of accounts and the directors' report were passed unanimously, and a dividend at the rate of 6 per cent. on the preference and ordinary shares, less income tax, for the half year ended 30th November, 1899, was declared.

NEW COMPANIES.

Caenewydd Colliery Company, Limited.—To acquire the land and minerals under Caenewydd Farm, Loughor, Glamorgan, and to manufacture and deal in fire-bricks, etc.

Grimsby Brick Company, Limited.—Capital £10,000 in £5 shares. To acquire land, buildings, etc., and to carry on the business of builders' merchants, brick and tile manufacturers and vendors, quarry owners, coal and iron merchants, etc.

Halton's Wood Brick Company, Limited.—Capital £5,000 in £1 shares. To acquire certain land forming part of Trafford-park, Davyhulme, near Manchester, and to carry on the business of brick, tile, pipe, pottery, earthenware, terra-cotta, and ceramic ware manufacturers, &c.

Owen & Dutson, Limited.—Capital £4,000 in £10 shares, to adopt agreements (1) with L. B. S. Dutson and J. E. J. Seedhouse and (2) with L. B. S. Dutson, and to carry on the business of brickmakers etc. Table A mainly applies. Registered office, Watling Street Colliery, Brownhills, near Walsall.

The Hereshaw Silica and Fire Brick Company, Limited.—To carry on the business of manufacturers of bricks and fire clay goods of every description. Capital, £7,500, divided into 2,500 5 per cent. cumulative preference shares of £1 each, and 5,000 ordinary shares of £1 each. Registered office: 83, West Regent Street, Glasgow.

Askam Brick Company, Limited.—Capital £10,000 in £1 shares. To carry on the business of manufacturers of bricks, tiles, pipes, terra-cotta, &c. The first directors, to number not less than three nor more than five are H. Mellon, R. F. Matthews. G. S. Heath and J. Field. Qualification, £300. Remuneration, £50 per annum, divisible. Registered office: The Brick Works, Askam-in-Furness.

Cunliffe's Kettering Brickworks, Limited.—Capital £15,000, in £10 shares. To acquire and carry on the business now carried on by W. Cunliffe at the Northfield Steam Brickworks, Kettering. The first directors (to number not less than three nor more than five) are: W. Cunliffe, H. F. Henson, and W. P. Symonds. Qualification, £500. Remuneration, £100 per annum, divisible.

Lodge Holes Colliery Company, Limited.—Capital £5,000 in £1 shares. To carry on the business of colliery proprietors, miners, coal merchants, coke manufacturers, brick and tile makers, etc. The first directors (to number not less than three nor more than five) are J. H. Smallman (managing director), S. Skidmore, H. Parker, and I. Williams. Qualification, £300. Remuneration. £200 per annum for the managing director and £50 each for the others. Registered offices: Bank Chambers, Wednesbury, Staffordshire.

Joseph Dando and Company.—Capital £10,000 in £1 shares. To acquire a freehold property together with the leasehold collieries adjoining, known as the "Pechells and New Bromley Collieries," and also the Bridge End Colliery, situated at Bromley, Staffordshire, and to carry on the business of coal masters, and merchants of clay and other mineral substances, etc. The number of directors is not to be less than two nor more than five. The first are Joseph Dando and Alfred W. Dando: qualification £10.

TRADE NOTES.

New Brickworks at Paisley and Glasgow.—The Walkinshaw brickfields on the Abercorn estate at Inkerman, near Paisley, are being opened up for making plastic brick. The shale heaps on Drumoyne estate, South Govan, near Glasgow, for making composition bricks have been acquired by the Drumoyne Brick Company, Govan, who are putting down machinery and erecting kilns at both places.

Death of Alderman Holland, of Bridgwater. — We have to record the death, at the age of 65 years, of Alderman W. T. Holland, who had served the office of Mayor on three different occasions, and had been alderman of the borough for nearly 20 years. He was at one time partner in the firm of Brown & Co., brick and tile manufacturers, and one of the largest employers of labour in the town. He was also chairman of the General Committee of the Bridgwater Infirmary, chairman of the Free Libraries Committee and a governor of Dr. Morgan's School.

Brickmaking at Fleetwood.—Quite a small town is springing into existence at Knott End (on the opposite side of the River Wyre), and to meet the large demand for bricks, Mr. Rabery of Poulton, has erected a new brickworks, which is now in active operations. He has a wire-cut machine at work with large drying sheds, so as to continue work during the winter, whilst a continuous kiln is approaching completion. One of the Committee of the Institute recently visited the works and was very pleased with the whole arrangement, which undoubtedly has a great and promising future.

Death of a Neath Brickmaker.—We regret to record the death of Alderman David Davies, J.P., of Neath, which took place at his residence, Glencoed, Neath, at the ripe age of 84. Deceased for many years carried on a successful business as a brick and tile manufacturer. Alderman Davies was twice mayor of Neath. He was elected a member of the Neath Town Council in 1875, and was made an alderman in 1888. He was a prominent member of the Calvinistic Methodist Connexion. In politics he was a Liberal, and for many years was an ardent temperance reformer, at the same time taking a great interest in educational questions.

The Boiler Explosions Acts.—The Board of Trade report on the working of the Boiler Explosions Acts, 1882 and 1890, during the year ending June 30, 1899, states that fifty-two preliminary enquiries and sixteen formal investigations have been held during the period named. By the sixty-eight explosions dealt with in these enquiries and investigations, thirty-six persons were killed and sixty-seven injured. The average number of persons killed per year since the Act of 1882 came into operation is 29.5, and the average number injured 61.3 per year. The numbers for the year 1898-9 are therefore somewhat high, but as the period includes one of the most disastrous of the explosions which have been investigated—viz., the explosion at Barking, which killed ten and injured twenty-three persons—they cannot be regarded as indicating any general increase in neglect or mismanagement on the part of steam-users. As in previous years, general deterioration, corrosion, and defective safety-valves, &c., are the prevailing causes of explosions, and that after these, defective design, workmanship, material or construction, or undue working pressure are the most frequent causes. In twenty-six cases the boilers were under the inspection of public associations, or were in steamships inspected by the Board's Surveyors, but in four of these cases the explosions were not due to defects in the condition of the boilers. The sixteen formal investigations related to—eight vertical boilers, four locomotive boilers, one Cornish boiler, one cylindrical egg-ended boiler, one marine boiler, one cylinder. These explosions resulted in the death of twenty-three persons, and forty-five persons were injured.

Death of a Surrey Brickmaker.—We regret to announce the death of Mr. Frank Mitchell, which took place on December 16th, at the age of 52. Mr. Mitchell had been ailing for some time, never having completely recovered from an accident which he met with a couple of years ago. The name of Mitchell has long been associated with the Littleton Brickworks, the deceased having carried them on for twelve years, whilst his father had previously conducted them for more than twenty years. The deceased was for some years a member of the Artington Parish Council, but at the last election retired on account of his ill-health. He leaves a widow and one son.

Purchase of a Fireclay Bed for £12,000.—At a recent meeting of the Leeds City Corporation, it was moved by Mr. Boston—"That the Council agree to purchase Holbeck Moor from the Leeds Fireclay Company, Limited, for £12,000, subject to a contract to be approved by the Town Clerk." Mr. Henry seconded the resolution. The minerals under the moor were most valuable. At a depth of thirteen yards there was a bed of fire clay three or four feet thick. These minerals were worth £400 an acre. If the company had been allowed to dig out the minerals, the probability would have been that some of the roads would have subsided, and the Corporation would have no remedy. The Town Clerk commented on the absolute right which the company had obtained to get the minerals. If in doing so a subsidence occurred, it would be a matter for litigation. Mr. Wilson supported the resolution, remarking that to enter into a lawsuit would probably cost as much as they were proposing to pay for the whole property. Mr. Scott: If we pass this resolution, do we secure the rights on the surface of the moor? The Lord Mayor: Certainly. The resolution was adopted.

A Big Tea Party—Mr. Itter and his Fletton Workpeople.—On Wednesday evening, January 3rd, Mr. A. W. Itter entertained his employees at the King's Dyke brickyards, together with their wives and families, to a meat tea in the Public Hall, Whittlesey, provision being made for about 450 guests. Immediately after tea the tables were cleared and the hall prepared for the evening entertainment. Over the platform was suspended the following banner: "A.D., 1892, Itter's Brickworks, King's Dyke, near Peterborough. Nulli Secundi." Mr. Itter presided, and was supported by Rev. F. E. Freese, vicar of St. Andrew's, Whittlesey, Mr. G. H. Boden (Fletton), and others. A pipe and an ounce of "Log Cabin" were afterwards presented to each of the men, whilst the women and children received sweets and packets of tea. The chairman, in addressing the gathering, appealed to every man to belong to the Sick Club, under whose auspices they had gathered together, and thus make it a stronger institution than it had ever been hitherto. This was the first time he had ever appeared in Whittlesey, but he hoped it would not be the last. He had made a fortune, and it was his desire that his employees should help him to spend it on occasions like the present. He did not want to close his works for a fortnight at Christmas time with perhaps another fortnight added on afterwards. He wanted to keep them all going, and to see them earning a comfortable livelihood. (Applause.) The tendency to-day was for masters and men not to meet together under the happy conditions which prevailed at that assembly. On the contrary, the tendency was to turn large businesses into Limited Liability Companies. He had been asked to transform his business into a company, but he said, "No," I will keep as I am, and when I can't do with it somebody else may have a go." A Limited Liability Company had nobody to kick, and no conscience to prick. He did not look at things in that light; he regarded his employees as brethren and as fellow men. He had always told them if they had any real grievance to come to him with the foreman on Saturday, and he would thresh it out. He did not want them to be afraid of the foreman or of him. (Applause.) All he required of them was that they should do their duty manfully, fairly, and honestly, and then he doubted not that the cordial relations which had subsisted between them hitherto would continue. (Applause.) The remainder of the evening was devoted to entertainment.

Changes of Address.—Mr. John Nash asks us to state that his address is now Queen Anne's Drive, Prittlewell, Southend-on-Sea. Mr. Joseph Jopling, late of Temple Chambers, has removed to Wallington, Surrey.

Messrs. Shepherd, Hill & Co.—Will our readers please note that this firm is not now in existence, as far as the making of brick machinery is concerned, and that the business has been taken over by Messrs. Johnson & Tucker, of Wilmington, Hull, to whom all communications should be addressed.

Death of a Leeds Machine Maker.—We much regret to have to record the death of Mr. Jno. Gill, senior partner in the firm of Messrs. Gill & Co., Brick Machinery Engineers, of Holbeck Lane, Leeds, and inventor and patentee of the well-known "Gill's steam brick press." Mr. Gill was for 11 years representative of the late Mr. T. C. Fawcett, of Leeds, and was a man universally esteemed by those with whom he came into contact. The business will be carried on by Mr. Gill's two sons.

A Victim of Influenza.—An inquest was held on January 8th, by Mr. Buss, coroner for Kent, relative to the death of Henry Batcheller, a brickmaker's foreman, 31 years of age, who, it was shown, was attacked by influenza on Friday. He complained of pains in his head, and was watched by a fellow-workman all night. He was left on Saturday evening apparently asleep, but shortly afterwards he jumped out of his bed-room window in his shirt and socks, and walked a mile. Next morning his dead body was found in a stream. A verdict of found drowned was returned.

Della Robbia Ware.—On January 4th, Count Plunkett gave a very interesting demonstration in the Faience Room of the Dublin Museum on the Della Robbias, treating their ware as enamelled sculpture. Having described Luca's marvellous *Cantoria* for the Duomo at Florence, and his panels on Giotto's Tower, and other works in marble and bronze, the lecturer dealt with Luca's enamelled terra-cottas, showing the differences between these and the other glazed wares of the fifteenth century. Count Plunkett also passed in review the masterly works of Andrea and Giovanni Della Robbia and their school, which glorify not only Florence and other cities, but even the little mountain towns of Italy. The lecturer showed a number of fine photographs, and drew attention to the "Meeting of St. Dominic and St. Francis," the "Annunciation," the Hospital frieze from Pistoja, and other Della Robbian works, of which there are copies in the Museum.

Stourbridge Fireclay Works.—The valley of the Stour is the centre of a clay deposit, the value of which was recognised as early as the sixteenth century. Although comprised within a circle of two miles, the delving and working of this material still affords abundant employment, and has led to the development of other though much inferior clay beds in the same district. The Stourbridge clay varies in the depth of deposit from 3 to 180 yards from the surface, and the thickness of the seams is equally variable, rarely exceeding, however, 42in. Some of the seams are soft and easily wrought with ordinary mining tools, while others are of a flinty nature, requiring the use of explosives to extract them. The best clay is used in the manufacture of posts for casting brass, glass, etc., and Mr. George K. Harrison, one of the most enterprising members of the trade, computes that 15,000 to 20,000 tons per annum of best pot-clay is consumed in the district. Clays of less quality are worked up into fire-bricks, gas retorts, etc. It is computed that during last year 40 millions of bricks were produced in the Stourbridge district. The production of fireclay in the district is 2,500 tons per week, affording employment to over 2,000 workpeople.—*Colliery Guardian.*

Notes on the China Clay Industry. — Heavy rains, which have come with the New Year in Cornwall, have made the over-burdens sodden and difficult to work, with the result that one or two accidents have already happened. In view of the Employers' Liability Act and the Workmen's Compensation Act, and especially having regard to some recent claims connected with this new legislation, proprietors of clayworks in the westernmost county who remain uninsured, are filled at times with not a little apprehension whenever a mishap occurs. At Christmas very little is attempted, much less done, by employers towards entertaining their workmen. The custom finds but little favour. When it is mentioned, the suggestion is apt to pass by unheeded. Yet we wish to say rather emphatically that, whereas upon occasions when business of moment has to be cleared off, manufacturers make an extra call upon the time and strength of their workmen, so it lies with them also in quieter times and seasons of holiday to lighten the cares and pass the hours of the workers in pleasantry. As a shining example of what might be done in this cheerful direction, we are glad to connect the firm of North and Rose, of the Fall Valley Clayworks, St. Columb Road, Cornwall, with one of these pleasant festivities. In arranging the annual concert for their workmen, Messrs North and Rose devised some charming vocal and instrumental music, and with Captain Arthur Minnear in the chair, this large Christmas party got on famously. One of these days an annual concert for workmen may become a generally recognised institution among clayworkers. On the subject of the relations which should subsist between employers and employed we get some further illumination from Cornwall, or, to be more precise, from the Retew China Clay Works, where occasion arose for the Cornish clay labourers to dine together. It was a stirring event of the Christmas week, just as the old year was giving up the ghost, and a great crowd of workmen gathered, representing all grades, from the least to the greatest. Dissecting the particulars, we find what it was that after 52 weeks' work, without a break, had brought about this pause, and it would be doing the occasion great injustice to omit to state it. We are glad to say it was a wedding. Mr. W. W. Hughes, the manager of the works, entertained the employés in honour of his marriage. In the absence of the host, the men had the company of Capt. W. Bullock at dinner, under whose genial chairmanship great hospitality reigned. The many kind words said of the bridegroom were not in excess of his merits, for under Mr. Hughes' management the affairs of the firm are getting on at full speed; so much so, that the chairman was able to cheer the company at the festive board with the intelligence of a prospective rise in their wages.

If there could possibly be any one to combat or gainsay the statement, we could cram this paragraph with statistics and facts to show that a shipping place comes better off in its export trade by reason of the proximity of clay works. The case of Teignmouth compels forcible attention to the subject, where talk of the past year's exports touches upon the steady favour into which that place of call has grown with coasting vessels, by reason of the clayworks of South Devonshire; a circumstance which tells so much to the advantage of Teignmouth that it now stands, as commercial men have been brought up to a pitch of great cheerfulness in declaring, the first port for exports in Devon and Cornwall. Favourable freights have led to this great press of business, combined with the enterprise of clay merchants in South Devonshire, who have left nothing undone that could extend the market for the native product. No enterprise in the West of England has yielded better returns during 1899 than the year's output from the clay pits in the vicinity of Teignmouth Quay, and a still brighter future is pictured there. Activity in the building trade testifies to the prosperity of Barnstaple, North Devon, during the year which has just closed, not for several years have so many additions been made to the number of dwellings in the town. For the addition of 20 houses of a convenient stamp, the enterprise of Mr. C. H. Brannam, of Barum ware fame, was responsible. One row of houses takes the name of Ceramic Place, and all are occupied, testifying that the accommodation was appreciated, and that a want has been met.

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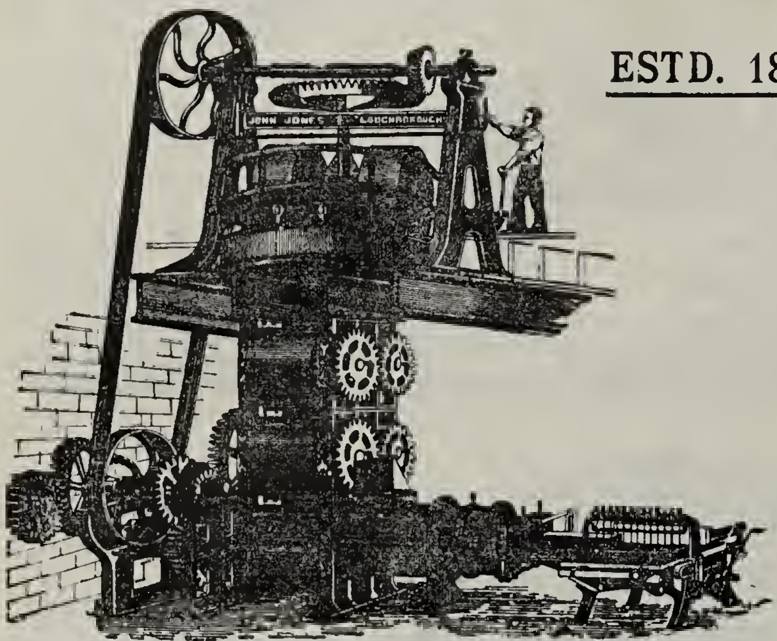

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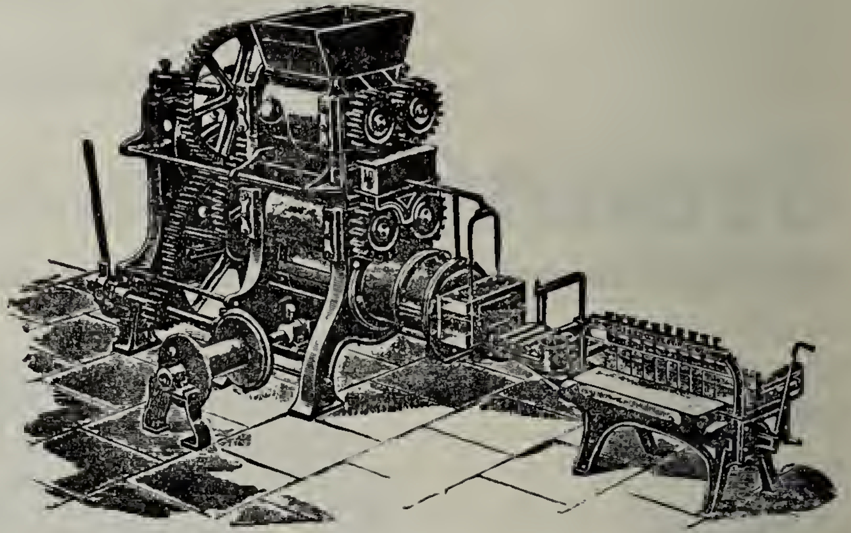

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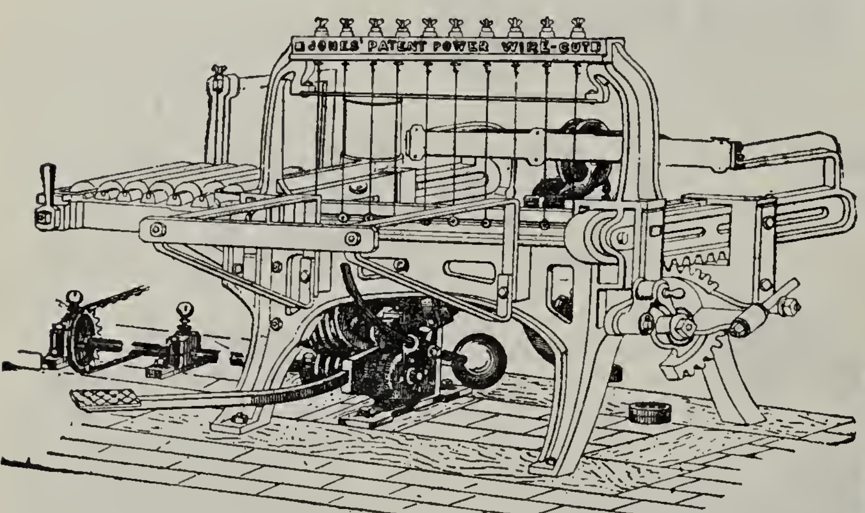

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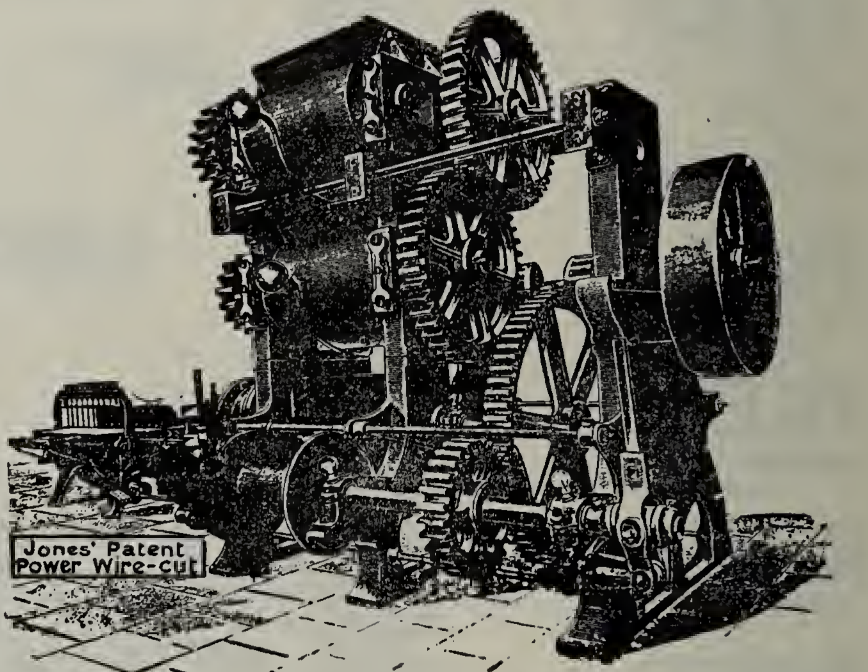

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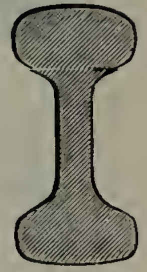

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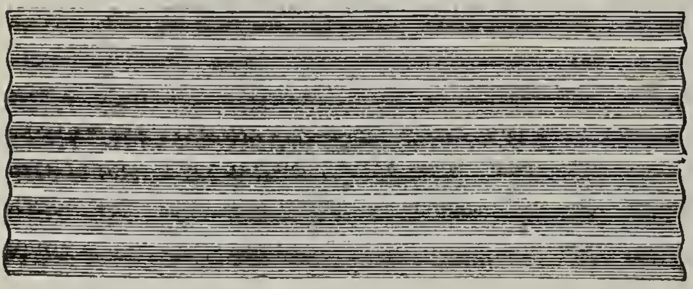

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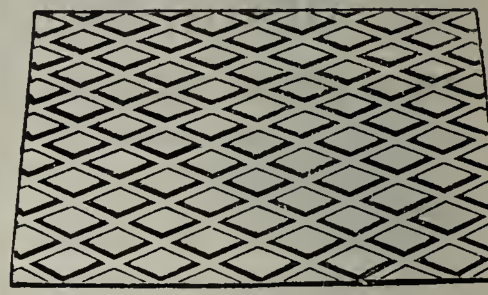

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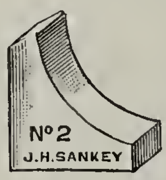

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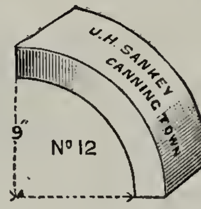

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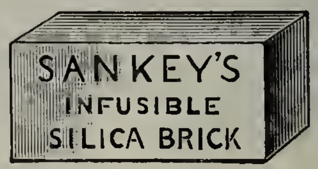

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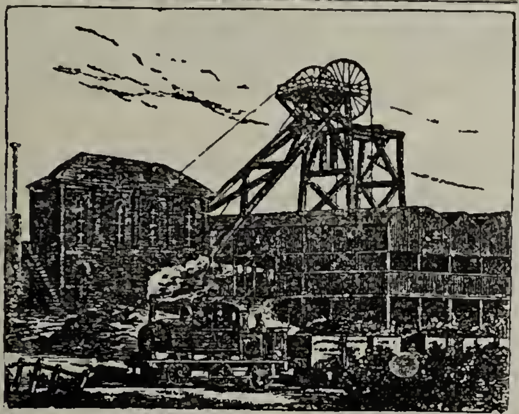

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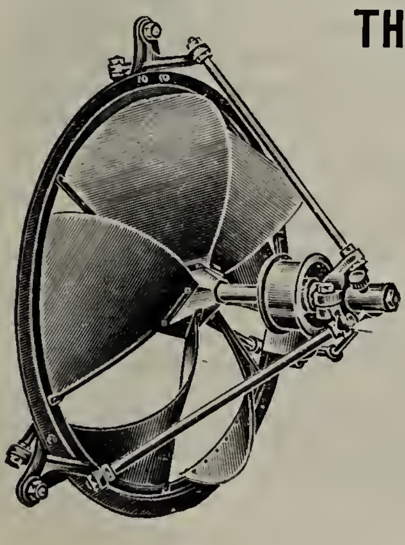

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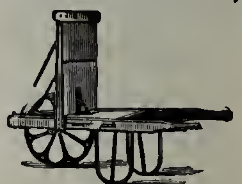

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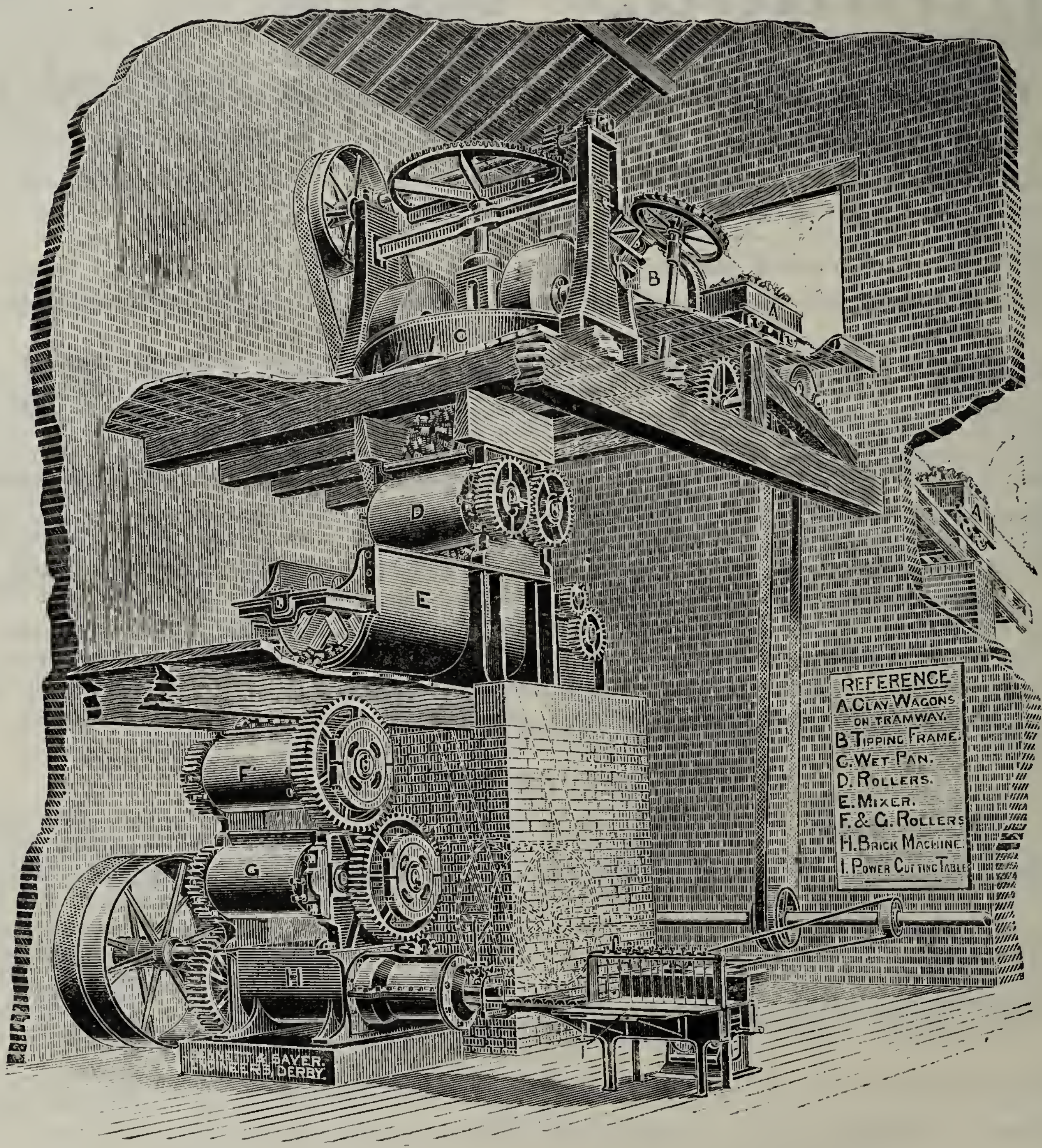

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The Illustration shows the interior of a Machine Room for working Hard Marls, Shales, &c.

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Plans and all particulars required for Starting New Plastic Brickworks complete with Dryers, Kilns, &c.

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THE BRITISH CLAYWORKER.

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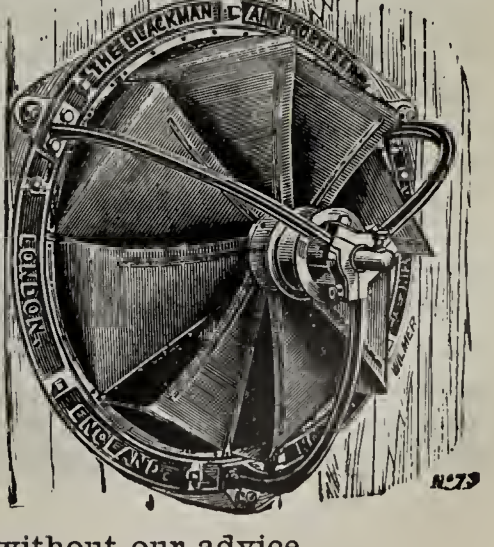


BY THE WAY.

WE would call our readers' particular notice to two matters requiring immediate attention from those whom they concern, which are mentioned in the paper this month. One is the necessity of combination among glazed brick manufacturers, and the other among users of traction engines. The former is naturally restricted in its application ; the latter concerns every brickmaker who may now be using traction power, or who may be thinking of doing so in the near future. The Institute of Clayworkers is now in a sufficiently strong position to make its power felt in any action it may decide to take on these matters.

* * *

IN our *Brickbuilder* pages will be found particulars of the Building Trades' Gift to the Nation, which is to take the form of six houses of rest at Bisley, to be built by the contributions in kind or in money from those engaged in the various branches of the building industry. Subscriptions are flowing in, and the brickmaker is playing his part handsomely. We give a list of contributories to-date—we shall be glad to be able to announce in our next issue that all the material necessary for the carrying out of the scheme has been subscribed. The war has made many claims upon our pockets one way and another, but no scheme we think will appeal more effectually than that of helping those men who, at some time, have been engaged in some branch of the building trade.

* * *

WE do not understand where some of our learned contemporaries get their information about the price of bricks from. And, we do not know what use the information would be if they were enabled to give it in anything like correct terms. The only conclusion we can come to about the matter is that they have never bought any bricks, or that they get the information mostly at second-hand, the wish of the informers being father to the thought, so to speak. The value of "grizzles," "hard stocks," "soft stocks," "Staffs. blues," etc., is very interesting, no doubt, if we could find whether the said bricks would be, at the prices named, on "the job," at the "wharf," at the "goods yard," or at John O'Groats, or Land's End. Also, whether the prices are by arrangement, or—otherwise. Also, and this is more important still, whether the prices given have been supplied by interested or disinterested persons.

* * *

THE prosperity of the brick and tile trade in Exeter has roused in the builders of that city the ambition to try and satisfy this healthy demand from works of their own. To supply bricks and tiles to the traders regularly, copiously and cheaply, is an undertaking which Exeter builders believe they have the right to give and the power to perform. They have not yet seceded from the ranks of buyers at the existing works, three in number, but they propose soon to change the whole face of things in that respect, having formed a local syndicate, whose exertions point strongly to business. For the most potent fact about this formation is that the syndicate is erecting, in the higher part of Exeter, works which they state will embrace everything that the trade looks for in the way of plant, machinery, and general outfit. This scheme of the Exeter builders is not without a certain amount of interest to the brick and tile trades, who are brought to see that if builders elsewhere exert themselves in that direction, it is a consideration not to be slighted, and manufacturers must look to it to do the best they can to meet and combat this co-operative idea, or some of them ere long may retire from business for want of customers. We do not know too surely whether this little enterprise of the Exeter builders will work out quite as well as they would like it to, for although they have an immense opinion of it at present, and are resolute in their endeavours, they have achieved nothing up to now, except to overcome the preliminary difficulties. Some experienced men in Exeter express the belief that the experiment will fall flat, however laboriously and carefully worked, against the local brickmakers, now that the latter, seeing the turn which events are taking, begin vigorously to bestir themselves. The Exeter makers fully realise what this competition means, and it is said they are fully prepared to meet it. However that may be, the experiment of a builders' syndicate opens a wide question for the brick and tile trade, and will be watched with more than usual interest as to its developments.

* * *

ONE or two correspondents are very anxious to know whether we contemplate taking any steps in respect to the libellous statements recently published in a contemporary concerning this Journal. The statements referred to the fact that the *British Clayworker* was the mouth-piece of the Fletton masters, that the Fletton trade *alone* received any encouragement or help from it, and that other brickmakers had been favoured with its contempt, if not condemnation. As our contemporary did not attempt to controvert any of the statements which, in replying, we made in our December number, we did not intend to again refer to the matter, and, after all, it is not worth while troubling about libellous statements when no-one believes them. We can make a very shrewd guess as to the source from which those statements emanated, and we must say that we do not admire this system of Boer warfare, or in other words, "sniping" at the enemy from behind cover. It is, of course, too much to expect such persons to come out in the open to fight.

* * *

IT is wonderful how important is the place in the history of civilisation filled by the common brick. Man, while yet in the savage or "primitive" state, no doubt managed to build himself houses of wood and leaves—as, for that matter, do some of the lower animals. But it was not until he became part of a regularly organised community, with its subdivision of labour and its common life, that he was able to construct for himself temples and palaces out of uniformly-shaped pieces of burnt clay. Hence a collection of Chaldean bricks just exhibited by M. Heuzey excited great interest. The earliest were rudely shaped, evidently made without a mould, and had their upper faces arched, each brick marked by way of stamp by the impress of the maker's thumb. These, which were found in some quantity in the very lowest strata excavated at Telloh and Nippur, are considerably over 8,000 years old. Next to these came the bricks made for the city of Sirpula, bearing the ancient cognisance of that city—an eagle with a lion's head. And so we go through the stamped and dated bricks of kings like Eannadu, who reigned in Babylonia some 4,000 years before our era, to the beautifully painted and glazed ones found by Layard on the site of ancient Babylon.

THE BRICK-EARTHS OF GREAT BRITAIN.—XXXI.

NORTHAMPTONSHIRE—*continued.*

KETTERING DISTRICT.

In the last article we gave a general sketch of the distribution of the principal brick-earth (the Upper Lias clay) of North Northamptonshire, comprising the districts of Kettering, Wellingborough, Thrapston, and Northampton.

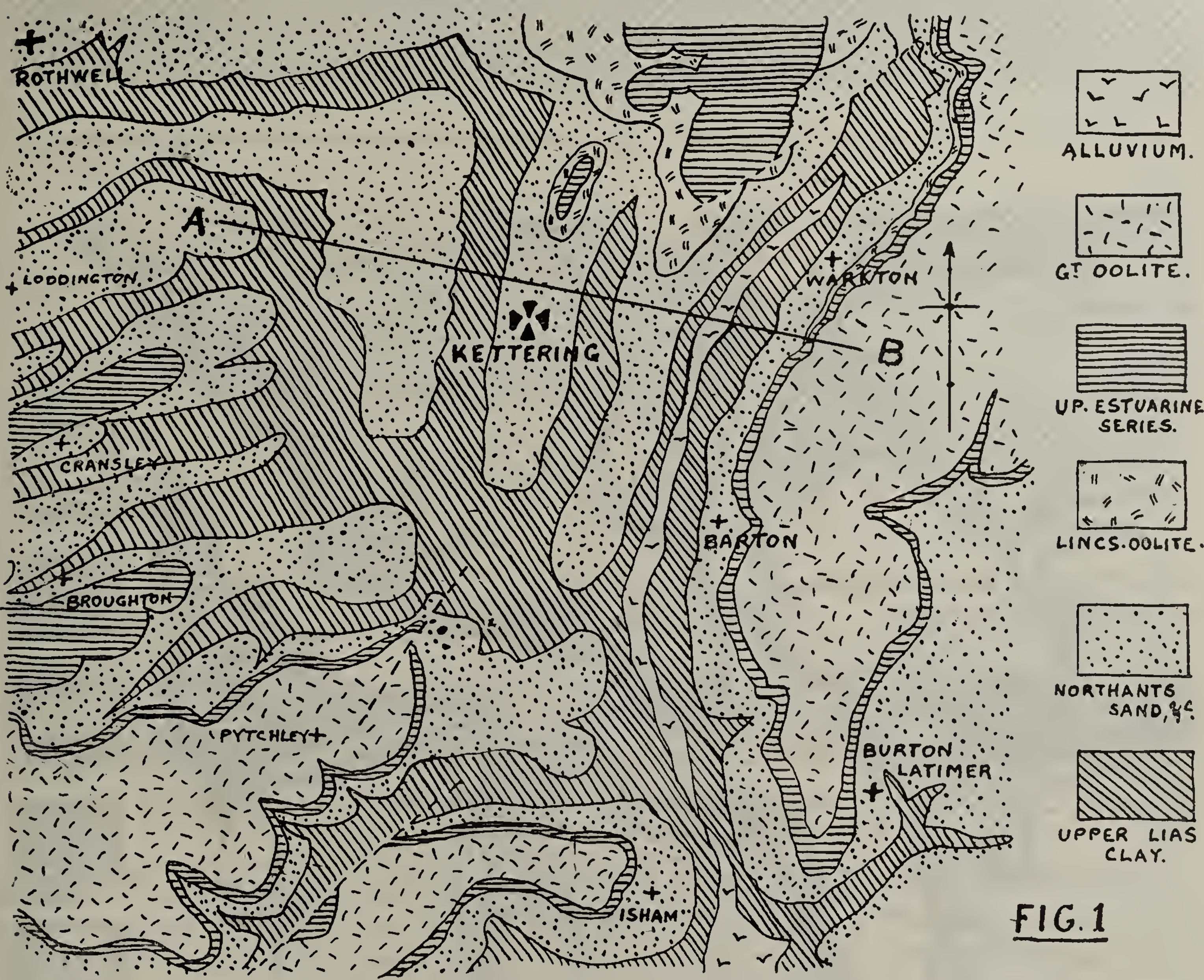


FIG. 1

FIG. 1.—SKETCH MAP, SHOWING THE DISTRIBUTION OF BRICK-EARTHS IN THE KETTERING DISTRICT.

We now follow that up by treating the districts more in detail, and especially showing the distribution of other, if less important, brick-earths in the same areas. The district embraced in Fig. 1 is interesting to the clayworker from many points of view. The sketch map is based on the 1-inch map of the Geological Survey, like the majority of the others in this series—only that official map does not deal with the different strata entirely from the clayworkers' standpoint. The Lias we have already alluded to, as well as the brickyards in it in the Kettering area. But, of the Upper Estuarine series there (see map), we have as yet said nothing. These are blue-black (weathering slightly brownish) unctuous clays, usually devoid of stones, or concretions, or fossils, and whilst they are not quite as plastic as the Upper Lias clays, they are eminently suited for brickmaking. They can usually be dealt with either by the semi-dry process, or as plastic clays. They do not require much pugging, and would not hurt to be sent direct from the pit to the press—which cannot be said of many clays used by the brickmaker. In bearing the latter observation in mind, however, it should not be forgotten that locally a few concretions may put in an appearance, in which case it must, of course, be well pugged, if not actually ground.

The proximity of the Lias, is, no doubt, responsible for the fact that little notice has hitherto been taken of the clays of the Upper Estuarine Series. It is our business, therefore, to describe the outcrop of these little-known earths in more detail than in the case of better-known brick-earths. Glancing at the map (Fig. 1), we see that these Estuarine Clays are found in force on the hill sides to the east of Kettering, running north and south, also to the south-west. The section (Fig. 2) along the line A-B shows their mode of occurrence in the vicinity of Warkton. Climbing the hill above the village, we find a small outcrop of the Lincolnshire Oolite which makes an ill-defined ridge along the escarpment. Then, still ascending, we rapidly pass over the Estuarine clays which are partly hidden by débris fallen from the Great Oolite above. The last-mentioned formation consists of white limestone and clay in this area, and where near the surface, little or no stone has to be removed as overburden, it can be used as a brick-earth. Following the estuarine clays, we find that they are fairly horizontal, and cropping out in Warkton Field, they extend to the vicinity of Barton Seagrave. Pursuing the outcrop southwards, there is a continuous strip to the hill promontory above Burton Latimer (see map) from whence it stretches northwards and eastwards by Barton Field, and Barton Lodge to Cranford St. Andrew (just off the map to the east.)

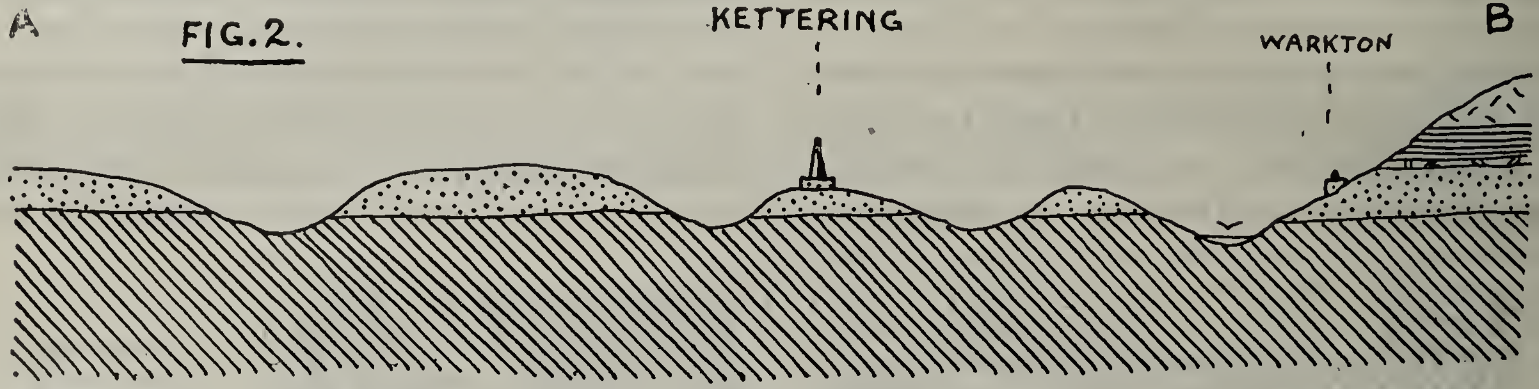


Fig. 2.—Section along the Line A-B in Fig. 1. (N.B.—The symbols employed are the same in each figure.)

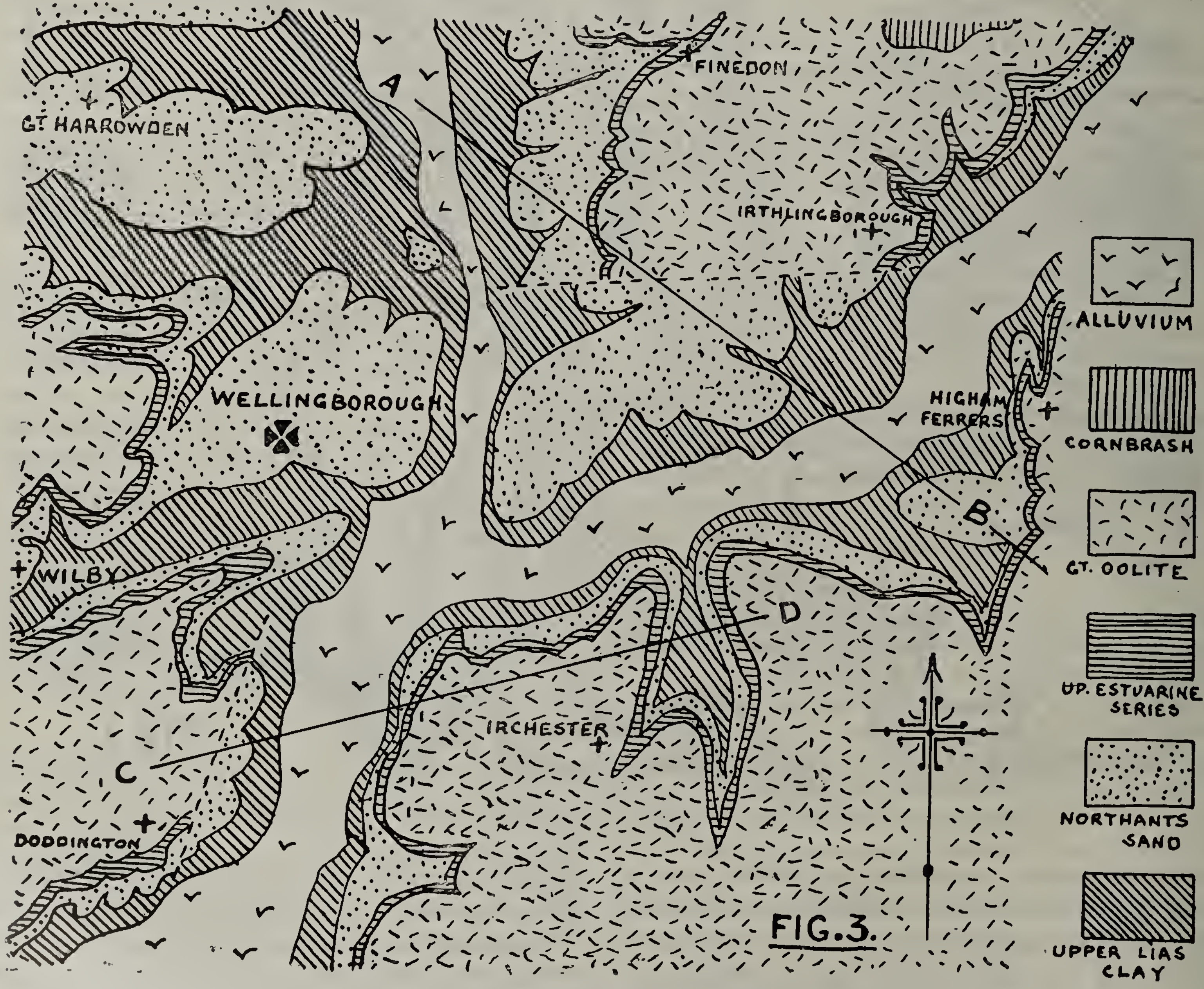
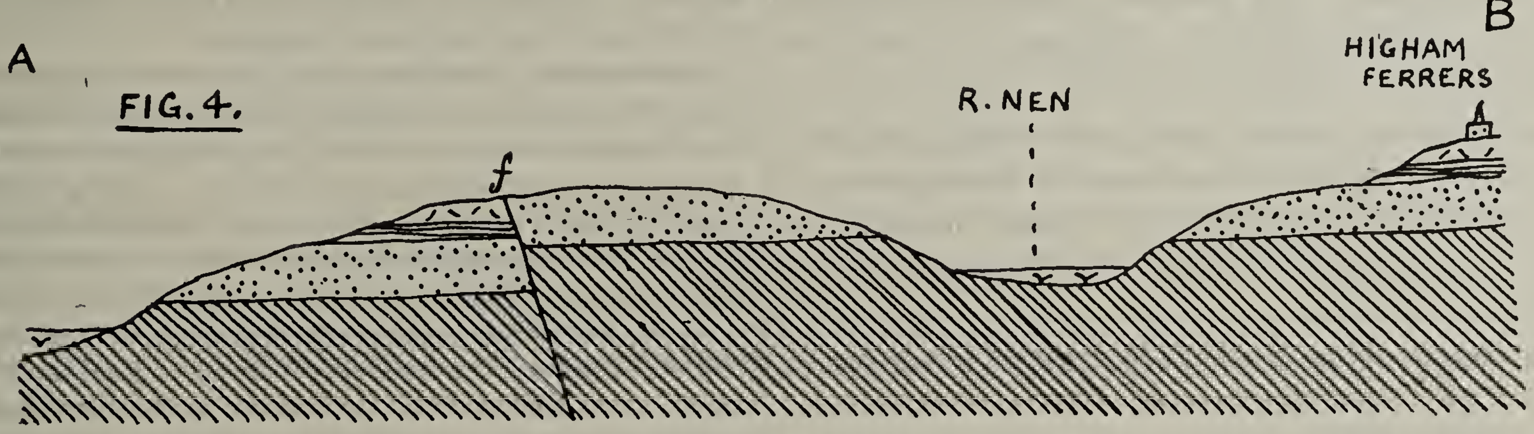
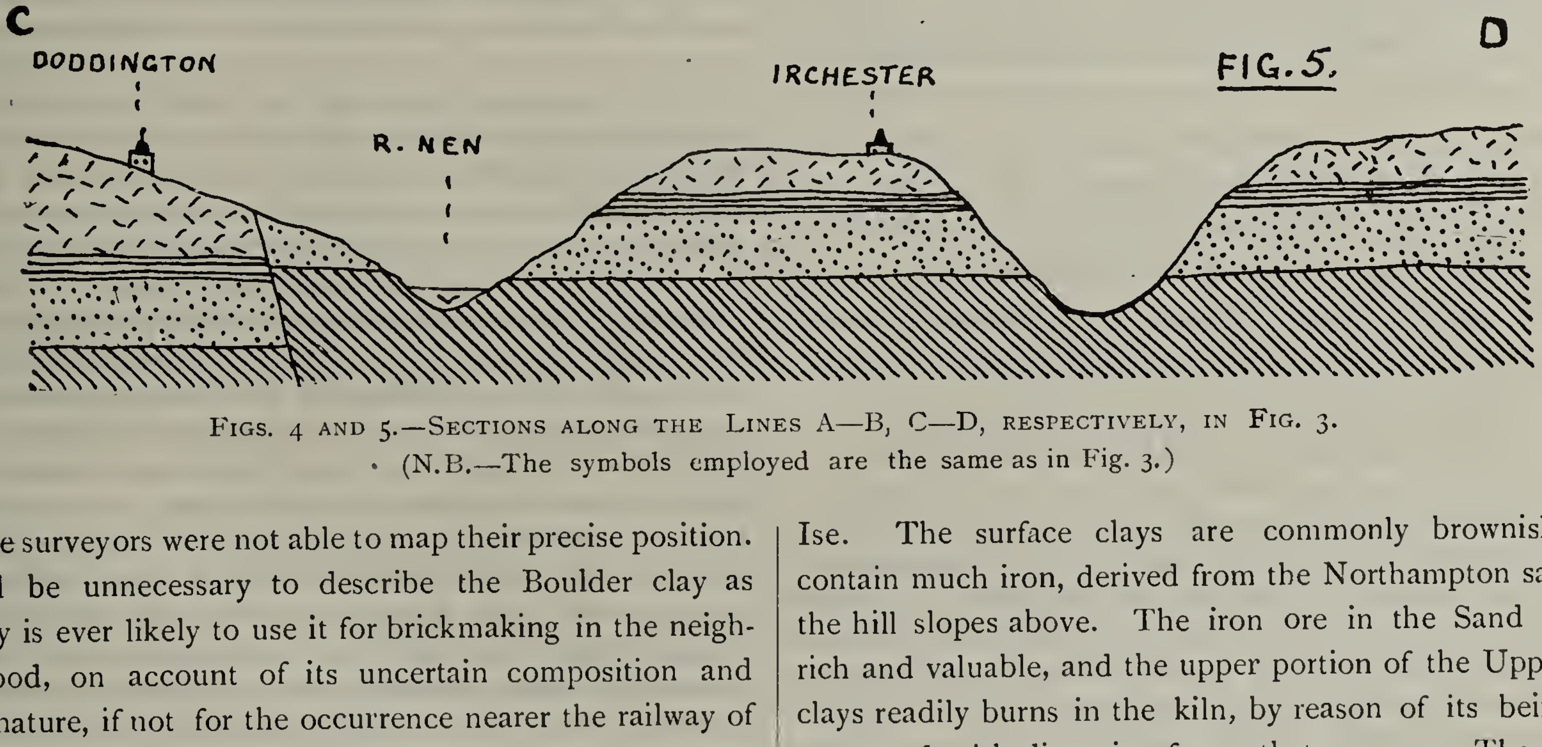


Fig. 3.- Sketch Map of the Brick-Earths in the Wellingborough District.

On the other side of the river valley, we find the Upper Estuarine clays well developed above the village of Isham, and on the steep hill slopes to Orlingbury. In that neighbourhood, however, they are cut off to the westward by a fault (represented by a dotted line on the map), and are brought abruptly against the Upper Lias clays. This fault has the effect of cutting out from the outcrop the otherwise regularly-disposed Northampton sand. Near Pytchley the Estuarine clays are again brought to the surface, but it is at Broughton, near by, to the north-west, that they are best delevoped through the removal by denudation of the overlying Great Oolite.

Unfortunately, the whole of these brick-earths to the west of Pytchley and Broughton are covered by such a thick deposit of Boulder clay, of a very gravelly character, that the surveyors were not able to map their precise position. It will be unnecessary to describe the Boulder clay as nobody is ever likely to use it for brickmaking in the neighbourhood, on account of its uncertain composition and stony nature, if not for the occurrence nearer the railway of less troublesome and better brick-earths.





Figs. 4 and 5.—Sections along the Lines A—B, C—D, respectively, in Fig. 3.
(N.B.—The symbols employed are the same as in Fig. 3.)

The Northampton sand here includes also some clays belonging to the Lower Estuarine Series, which need not detain us, however, as they are not of much clayworking interest. The fact is, the Northampton sand hereabouts contains so much iron that it even ranks as an iron ore, and all beds in it contain altogether too much iron for the brickmaker. The alluvium along the river valley is mainly silt derived from the destruction of the Upper Lias clay upon which it rests, and may be worked with these latter for brickmaking. The section Fig. 2 clearly indicates that the whole of the Kettering district is underlaid by the Upper Lias, which are exposed along the river valleys in all directions, and are capped on the higher ground only by the Northamptonshire sand and overlying beds.

Wellingborough District.

The brick-earths in this district are, practically, of the same kind as those near Kettering, but there are a few points of local interest, and the map and sections (Figs. 3, 4 and 5) may prove useful. The Upper Lias clays are, here, very excellent materials for brickmaking. They crop out more particularly along the valleys of the rivers Nen and Ise. The surface clays are commonly brownish, and contain much iron, derived from the Northampton sand on the hill slopes above. The iron ore in the Sand is very rich and valuable, and the upper portion of the Upper Lias clays readily burns in the kiln, by reason of its being impregnated with limonite from that source. The Upper Estuarine clays are exposed on the hill sides to the west of Wellingborough, extending on the one hand to Wilby, where there is a brickyard, and on the other northwards and westwards to Wellingborough Lodge. The same clays are also found on the hill slopes at Finedon southwards, in the neighbourhood of Irthlingborough, and on the southern side of the Nen near Higham Ferrers, and by a straggling outcrop to Rushden, Irchester, and round towards Irchester Lodge. Near most of these places there are large brickyards, but not in the Estuarine clays—the Upper Lias clays being more favoured. Along the Nen the last-mentioned formation is well spread on either side of the valley near Higham Ferrers, and there is an important valley outcrop towards Rushden. Again, at Irchester the southern bank is deeply indented, and passing by the old Roman station the outcrop becomes considerable to the southward. At Wilby, and at several localities between that place and Wellingborough, the Upper Lias has long been drawn upon for brickmaking, as well as nearer the railway station. A rivulet trending westwards near Great Harrowden, and another to Little Harrowden, have bared several square miles of the Upper Lias, which here practically defies competition from other clay beds. The Alluvium is also more expanded than near Kettering, though its composition is about the same except that it contains more iron. There is a considerable stretch of surface gravel in the valley to the west of Finedon, and again to the south-east of Wellingborough; but none of the drift deposits in the district are very suitable for making high-class bricks, the Upper Lias is the better formation by far.

Glancing now at the sections, Figs. 4 and 5, we notice that the Upper Estuarine clays are cut off on the hills to the east of Wellingborough by the action of a fault (Fig. 4) which brings both those clays and the Great Oolite abruptly against the Northampton sand. The dotted line in Fig. 3 shews the direction of this dislocation. A phenomenon due to similar causes is exemplified by Fig. 5, in which the fault to the east of Doddington deprives the valley of the Nene thereabouts of what would otherwise undoubtedly be an outcrop of some value of the Estuarine clays. The effect of the inlet near Irchester (vertical scale, of course, exaggerated) also comes out in the last-mentioned section.

THE USE OF THE BLOWPIPE.

We have from time to time described the use of the blowpipe in examining the mineral contents and chemical composition of brick-earths. And, we find that there is a certain class of individuals which, whilst they seem eager to learn something of practical value in that respect, do not seem to read to any purpose. They, apparently, expect to get a satisfactory result when they do not follow instructions. When we describe the difference between the reducing and the oxidising flame, and explicitly state that certain results follow upon using the one, which are not obtained by using the other, we mean it. Yet, there are clayworkers who will not take the slightest trouble to attain proficiency in using the two flames, and then complain that their work leaves much to be desired.

Common Sense Insurance.—The provisions of the Workmen's Compensation Act necessitate that every employer of labour should cover himself against accidents. The British Clayworkers' Mutual Insurance Corporation, Limited, was formed to insure brickmakers at the lowest possible cost, with a division of profits.

TRADE REPORTS.

Belfast.—The Building Trade, during the past year, has been very slack, considering the position occupied during the past few years. Money being dear, speculation has been very dull and the number of buildings erected has been nearly 2,000 less than those erected in the year 1898, and about 700 less than were erected in 1897. There has been very keen competition in the Brick trade, with the result that prices have been very low and unremunerative, consequently several brickworks have been closed down during the year. But owing to the low selling prices it has been possible for some of the makers to send large quantities of bricks to many outside places, which have kept their works fully occupied. There appears to be a better prospect of trade for this year—several big jobs are likely to come out for which large quantities of brick will be required. Tenders are already invited for the building contract of the Royal Victoria Hospital (Belfast).

Blue Bricks.—The Blue Brick Trade for the past year has been, like the few previous years, very brisk, and there are very good prospects for the coming year, owing to so many large and important engineering works always cropping up, besides those at present in hand. Prices have maintained their level with an upward tendency owing to increased cost of fuel and higher wages. Some makers, however, will always cut prices, however the market be, singularly enough to their own loss and without the slightest reason for it. Fuel is likely to keep at its present level for some little time yet, unless the colliery proprietors are determined to kill the goose which lays the golden egg by still further increasing the price which already is far too high in proportion to the prices of other commodities. There is no evidence of a decline in the demand for blue bricks which, for engineering, sewering, and water schemes, still keep to the front. The Great Central Railway has taken a large quantity of brindled bricks the last two or three years, but still the demand for these continues about the same as for some years past. There is every indication that the brisk demand for blue bricks will continue for some time to come.

Essex.—The trade throughout Essex during the past year has been exceptionally good, particularly so as regards the sale of stock bricks by non-members of the Kent and Essex Brickmasters' Association. There are one or two firms in North Essex who continue to sell stocks at 40s. per thousand; place bricks at 32s. 6d., grizzles, 35s., and roughs, 27s. 6d. We also know of another order being placed for common unpicked stocks at 37s. 6d., for delivery in March next. The red-brick trade has also been fairly good. The yards along the Great Eastern Main Line have done exceptionally well, whilst the Hedingham district, although not doing quite so well as other yards which are better situated, maintained its prices during the earlier portion of the year. This district some fifteen years ago produced about half-a-million of red facing bricks for the London market. Last year the output reached something like fifteen millions. The spring trade promises to be a good one.

Kent Stocks.—The Kent and Essex Brickmasters' Association take a very gloomy view as to the prospects of the trade during the coming year. So far as they are concerned, they consider that the brick trade is in a very critical condition. The war is one factor, and another is the severe competition which has sprung up in recent years in the Midlands. At the present time Stocks are a falling market, and have now come near to the figures of the period of depression some three years ago. A local journal writing upon the subject of the slump says:—"Unless a change for the better takes place, which is most improbable, the district will have to face the greatest crisis which it has been called upon to endure since the unfortunate days of the strike. The situation has to be faced. The brick trade, as much as any trade, is affected with the swing of the pendulum which indicates good or bad times. It has enjoyed three most profitable seasons, and it is only reasonable to suppose that during this period of prosperity the possibility of a retrogressive movement has been anticipated, and, as far as possible, provided for." As a matter of fact an arrangement has already been entered into whereby the output during the coming year will be reduced by 16 per cent. as compared with that of last season. One stool in six is to be closed in the large fields, and in fields with three stools, no reduction in the number of stools will be made, but the sixteen per cent. reduction is to be made in the output of these stools. It is stated that, with a return to the normal prices of four years ago, the twenty per cent. increase of wages which followed up the improved prices will be cancelled. Prices have undoubtedly dropped very considerably. Stocks are quoted at 27s. per thousand in the field, Grizzles at 24s., Roughs at 21s. and Place at 21s.

Leicestershire Reds.—During the early part of the year business between Leicester and London was good at fairly remunerative prices, but towards the close of the year a sudden fall in prices took place, and common wire-cuts were reduced as much as 3s. to 4s. per thousand. This, with the great advance in the price of coal, makes the outlook anything but pleasant for the common wire-cut manufacturers. Although local trade remains fairly good, the prospect at the present time is not very rosy, although it is not expected to be anything phenomenally bad.

Newcastle-on-Tyne.—In that important branch, the Fire-Clay Industry, last year has been one of the busiest years in the history of any manufacturer here. In Fire-bricks there has been no demand to equal that of the past year since 1872-3-4. Notwithstanding the enormous increase in the output of the Tyne-made Fire-brick, since the years afore-named, nearly every important colliery has put down plant for their manufacture, and every one of them has been kept going to the fullest extent. In Sanitary Pipes the demand has likewise been very great, and manufacturers have been able to sell almost direct from kiln to truck. In Glazed Bricks the demand has also been very great, and prices have considerably stiffened during the course of the year in this district as well as in all other districts in England and Scotland, Every common brick-yard has also been kept going to its fullest possible extent. It is generally believed that the demand in all these branches will continue for at least another twelve months. In connection with the Sanitary Pipe trade, a pleasing function took place during the course of the year. The Manufacturers are members of a Local Association, and are affiliated with a National Association, and for the past seven or eight years they have been kept together on the very best terms, largely through the instrumentality of their genial and able Secretary, Mr. Matthew Smith, of the North Bitchburn Coal Co., Ltd., whose services have been highly appreciated. In token of this a very handsome present was made to Mr. Smith, consisting of a large silver tray with suitable engraving, together with a fine comfortable armchair. A capital gathering was held for the formal presentation, during which members spoke in the highest terms of the efficient service rendered by Mr. Smith to the trade.

TRACTION ENGINES ON ROADS.

AN APPEAL TO USERS.

WE report in another column an important case recently tried at Leicester, where a brickmaker has been mulcted to the extent of £105 and costs, for a year's "excessive" use of the highway for the conveyance of bricks. We also mention an action pending at Norman Cross, Peterboro'.

In our "By the Way" notes of last month, we gave a further instance of an attempt to saddle a company with the costs of "exceptional" traffic. This was, however, in respect of carting, but the principle is the same. In that case, the action was withdrawn, and a further non-intervention, after threatenings, was evidenced in the case of another yard which has come under our notice.

We cannot look at this point from a strictly legal side of course, but the position to the lay mind is this:—If a County Council or other authority issues a license for the use of a traction engine on a road, the said Council knows perfectly well that excessive wear and tear beyond that usually occasioned by carting must necessarily ensue.

They grant the advantages of a license and yet object to one's receiving the benefit of such license. Further, they cannot refuse the granting of a license, as an appeal case reported in our issue of December, 1898, clearly shows.

We feel strongly that this is a subject the Institute of Clayworkers might take up to advantage, even going so far as to institute an appeal case, so as to get the question definitely settled. We should be glad if ALL USERS OF TRACTION ENGINES ON ROADS would communicate with us, whether they have been already proceeded against or not. We can then set to work to do something.

LEAD COMPOUNDS AND THE GLAZED BRICK TRADE.

COMBINED ACTION NEEDED.

THE manufacture of Glaze for Glazed Bricks is a matter which at present seems likely to demand the attention of manufacturers, in view of the very definite attempt on the part of the Home Secretary to bring the manufacturers under the regulations adopted for the protection of workers in Noxious Trades. Should these stringent rules be enforced in the use of lead, they are certain to entail increased expense in production, and it becomes necessary for makers to decide whether they will accept these conditions or abandon the use of lead in the various glazes. It is true that the Government regulations offer an alternative of isolating the lead glaze department from the rest of the works, but this in many cases involves structural alterations, whilst the effect is only to mitigate the inconvenience and expense resulting. It is true that a considerable proportion of the producers of glazed bricks have wisely insisted on the exclusion of lead compounds from the list of ingredients available in their factories, choosing rather to incur increased expense in fuel by firing at the higher temperatures, which are usually required for firing felspathic glazes. This policy is, however, not by any means universal in the trade. In the desire to reduce the cost of fuel as well as to produce brighter glazes, the introduction of a certain amount of lead frits into the glazes has been accepted as necessary.

While the additional glossiness of surface may not be so important in the glazed brick section, this quality is obviously a *sine qua non* in glazes used for sanitary ware, and in those works in which both classes of goods are made, the managers will no doubt be exercised in deciding what course to take in this matter. The large superficial area of a sanitary article is so much more than that of a glazed brick, and the cost of making is so much greater that the loss through defects is a serious consideration, so that under this head there is no doubt that the use of lead shows to considerable advantage. The glazes are easier to work, and the ware is brighter; while their fusibility is greater as compared with lead-free compositions. The maker of sanitary goods is therefore left between two alternatives—the abandonment of lead at the risk of lowering the quality of his ware at a higher cost, or of accepting the use of lead frits with the enforcement of Government supervision.

Should the Home Office frame the Regulations for brick works using lead on precisely the same lines as those for potteries, which is most probable, it becomes important for manufacturers to consider seriously what course to take in view of the very short space of time allowed them to formulate their objections. In the circular last issued to the potters relative to this subject, it is hinted that, within a limited period, the Government will insist upon a definite limit of soluble lead in the glazes, and it is even stated that the very low amount of 2% will be the limit accepted.

In view of the difficulties of the situation, the Manufacturers Association in the potteries district has been able to present their objections to the Home Office in such a convincing form that it is probable a considerable length of time may elapse before the regulations foreshadowed are put into operation, and it is even possible that some of the recommendations made by Professor Thorpe in his report will be allowed to lapse in view of the difficulties entailed in their adoption. How far the brick makers are prepared by combination to bring a protest against any serious interference in the techniques of their manufacture remains to be seen, but it is obvious that if any action is to be taken this must be done forthwith, otherwise the whole trade will be under the regulations incidental to the use of lead compounds, entailing serious increase of expense in the outlay for washing apparatus, lavatories, ventilating fans and other appliances.

In the case of those employers adopting the use of soft glazes such as are necessary for majolica glazed bricks, the difficulties are even greater in the abandonment of raw lead though this is certainly not impossible. When, however, the amount of lead frit allowed is limited to so small a percentage as is proposed, there will certainly be a serious disarrangement of the composition of formulæ at present in use, and these will require to be re-adjusted with considerable care. The substitution of leadless glazes in this section, though not entailing the extreme difficulty which is found in the pottery manufacture, is nevertheless sufficiently troublesome as regards the matching of colours hitherto adopted in plumbiferous glazes, and a sufficient margin of time is required for experimenting before they can with safety be put into use in bulk for manufacture.

It seems reasonable, therefore, that manufacturers in the brick trade should enter some protest against the undue haste which seems to be evinced in settling this matter without reasonable consideration.

BRICK DRYING.—II.

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Effect of Consistency.

If a clay is made by hand, it must be prepared in a sufficiently soft condition to fill the moulds completely, and, therefore, requires the addition of more water of manufacture than if made by machine. It is of interest, therefore, to point out the effect on the shrinkage and the volume of spaces when dry, of the addition of different quantities of water to the same clay. Taking 100 parts by volume of an average mild clay such as that illustrated in Fig. 3 of the diagrams given in the previous article (January), experiment shews that:—

With the addition to the dry clay of:—	A shrinkage in volume when dried will occur of:—	And the spaces will be of the total volume of the dry brick:—
*10 p. c. water.	4 p. c.	21 p. c.
15 ,, ,,	11 ,, diff. 7.	22½ ,, diff. 1½
20 ,, ,,	20 ,, ,, 9.	24½ ,, ,, 2
25 ,, ,,	30 ,, ,, 10.	27 ,, ,, 2½

This table shews that the less the water used in manufacture the more solid is the resulting brick.

If, now, the bricks made with varying amounts of water of manufacture are subjected to exactly the same conditions of drying, the rate is not proportional to the amount of water added, but takes longer in proportion for those with less water. It takes approximately proportional time in the first two stages of drying but the more solid the brick, the longer it takes to eliminate the water in the last stage. It follows also from this, that want of uniformity in the substance of a brick, such as must exist in bricks made by hand, and in a less degree in those made through a die or in a press, causes a corresponding want of uniformity in the shrinkage and rate of drying in different parts of it. This is one cause of the warping or twisting of bricks in drying.

Effect of Rapidity in Drying.

The shrinkage of a brick is also affected by the rapidity with which it is dried, a point which is noteworthy, because of the increasing use of rapid-drying systems at the present time. The shrinkage is less with rapid drying, probably because the clay particles do not have time to accommodate themselves to new positions in the course of the process.

Experiment has shewn that on bricks made with a given sample of clay, the shrinkage of one dried in 48 hours was 7¾ per cent. lineal, and of one dried in 15 days was 8½ per cent.

Effect of Size and Shape.

In all classes of clay, the brick in the second stage of drying loses water more rapidly on the outside than in the inside, the angles and arrises in their turn drying more rapidly than the faces. The consequent shrinkage of the outer layer is the frequent cause of cracking, and it is therefore necessary to pursue this stage with great caution, and to effect the drying with air already heavily charged with moisture. It is also for this reason essential to avoid excessive prominence of any part of a shaped brick, and it is advisable to follow the shaping with hollows so as to maintain an approximately regular thickness of material throughout. The frogs or indents on both sides of a common brick are serviceable in drying for the same reason. In a re-pressed brick they serve also the additional purpose of rendering the consistency more even throughout.

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*Of these quantities 5 per cent. is in each case hygroscopic water, which is not dried out till steamed in the kiln.

For objects of reasonable size the rate of drying is approximately proportional to the ratio of surface to volume. Objects of large size, however, take much longer to dry, and require application of considerable heat to complete the removal of all the water of manufacture from the interior. Many large goods made of fire-clay and stoneware clay require extremely careful treatment, and have to be kept in a heated atmosphere for several days after the moisture has apparently all been removed. Disastrous results are frequently known to occur in the steaming operations in the kiln for want of sufficient care in this particular. Manufacturers frequently adopt a wise precaution in having such goods stamped with the date of making, and in holding their workmen responsible if they are rendered unsound by being burnt before the lapse of a stated period of drying.

SUB-DIVISIONS OF PRACTICE OF DRYING.

The practice of drying as before stated divides itself naturally into two sections :—(1) Drying by a large volume of air at ordinary temperature, and (2) drying by a less volume of air at artificially increased temperature. To this may be added a third method in use in the potteries, but not used in brick manufacture ; that of drying by absorption.

To notice it in passing, it should be stated that it is a method in which moulds are used, made of plaster of Paris. This material, when dry, absorbs moisture rapidly from clay in contact with it. There are several important precautions to be observed in the manufacture of the moulds, and they must be dried after use to fit them for the same function on the next occasion. The method serves to stiffen moulded pottery, such as lavatory basins, closets, and other large ware, so that when removed from the moulds it may be handled without deformation.

As this process is not used in brickmaking, it is not necessary to go into its details in these papers.

OPEN-AIR DRYING.

The oldest and most used method of drying bricks is by large volume of air at ordinary temperature. This is practised in a variety of ways, simplest of all of which is, open-air drying without protection of any kind. Even at the present day this method is in use on the Continent. A level piece of ground is evenly spread over with sand upon which newly made bricks are placed in rows on their edges. The writer has seen this practice followed near Buda-Pesth, in Hungary, without provision being made for protection at any time. In some places the bricks are only left so exposed until sufficiently stiffened to be picked up and stacked in hacks or blocks. When so stacked they are skintled in a manner to be presently described, and they are protected by a covering of straw till ready for burning. An improvement on this primitive method is known as drying on hacks.

THE HACK GROUND.

An even surface of ground of suitable extent is selected and a series of straight hacks constructed on which to place the bricks. Due care and forethought are necessary in deciding the direction of the hacks. The most important consideration in determining this, is provision for cheap and efficient drainage, as it is essential above all things that the ground should not be liable to become flooded by storms, or to retain water and remain damp long after rain.

The most suitable direction, if possible, is due north and south, so that both sides of a hack may receive an equal amount of sunshine, and so that neither side may be subject to the direct rays of the midday sun. Some authorities are of opinion that the hacks should be constructed broadside to the most prevalent winds, but it is manifestly preferable to make them end on to the direction of storms, so that neither side is directly exposed to their effects. It is also preferable to give the strong wind play directly through the pathways between the hacks, so that moisture is carried away equally throughout.

If possible, therefore, in this country the hacks should extend either north to south, or north-east to south-west.

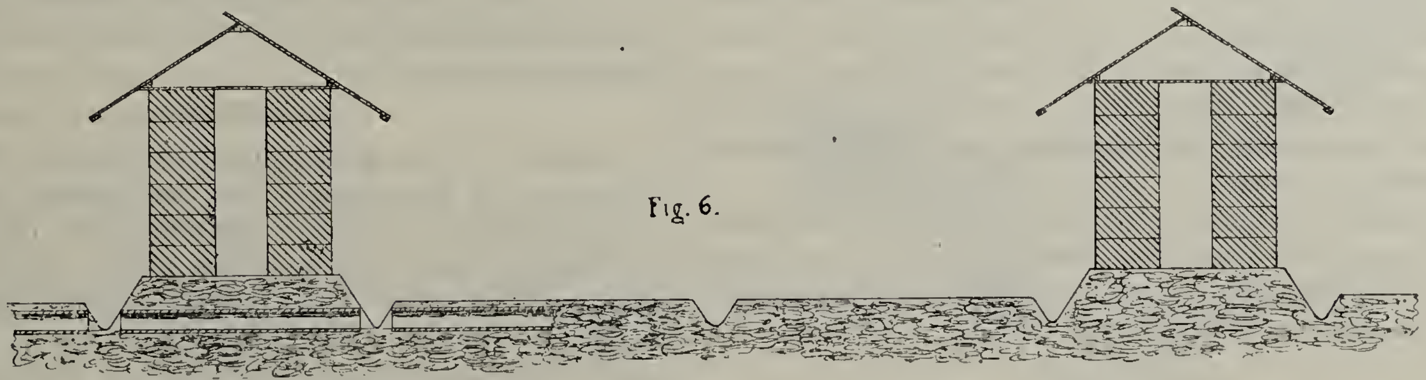


Fig. 6.

The ground being selected, and the direction of the hacks determined, it is necessary to insert next, just below the general level of the ground, such conduits as may be necessary to carry off rain rapidly and completely. Agricultural land-drain-pipes in 12-in. unsocketed lengths, and 3-in. internal diameter, are efficient for drainage when the pathways of the hacks do not slope suitably to carry off water without such aid. These should be placed under the hacks and under the pathways in the requisite direction, and at intervals of 10 or 15 yards apart.

The centres of the hacks should be spaced from 10 to 12 feet apart, and the hacks themselves formed 2ft. 6in. wide. They should be made about 4in. high above ground level, by banking up a layer of earth which may be afterwards topped with clean sand, evenly spread. It is a very good practice, serving at the same time to provide drainage and form the raised hacks, to turn up the soil from small trenches along the sides of each hack, and down the middle of each pathway, as indicated in cross section by the diagram (Fig. 6).

This diagram, at the same time, shows the land drain pipes before mentioned as a provision for carrying off water transversely when required. Hacks are usually constructed of considerable length, 80 yards being perhaps an average. A ground to carry a million during our summer season would require 16 to 18 hacks of this length. The whole ground therefore for this output will occupy a space 80 yards long and

64 yards broad, or exactly one acre. It is practically not possible with most clays to fill and dry each hack more than four times in our summer season

Hack Setting.

Each hack is constructed to carry two *blades* or rows of bricks set on edge, there being a space of about 8ins. between the blades. The bricks themselves are separated from one another in hacking, by means of the *setting board* by a space of three-eighths to five-eighths of an inch, the bricks in the second row covering the spaces between those in the first row on which they are set (Fig. 7). The bricks may be set as much as 8 or 9 high, but this must be done gradually, the whole ground row being set first, then the whole second row and so on. This is necessary in order that the bricks below may get sufficiently stiffened to bear the weight of those above them. The setting board which is used to space the bricks is of the same dimensions as the pallet board, but of the special thickness decided on in each particular brickyard. It is retained in the hand of the hack-setter after setting each brick, the pallet boards being replaced on the off-bearing barrow.

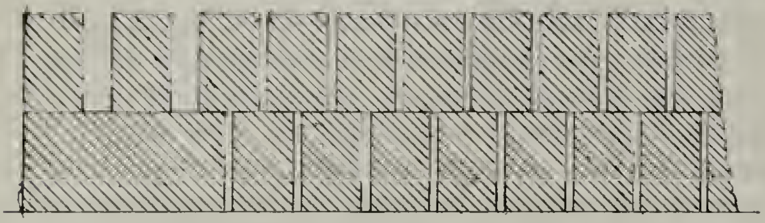


Fig. 7

When wire-cut bricks are set on hacks the bricks are taken from the boards one or two at a time by means of two small pallets, one in each hand of the setter, which are placed on the ends of the bricks to hold them when lifted.

Hack Covers.

Three methods are in use for covering open hacks apart from protection of the sides. The first and most primitive is by means of loose straw. For this purpose hard and long wheat straw is necessary. A wisp is laid longitudinally on the bricks, and on that a thick layer transversely, extending well over both sides. This method is expensive and wasteful, and is superseded in these days by the use of (2) portable hack covers, either of straw or wood, or (3) erected hack roofing. Wood is preferable, in the majority of cases, for hack covers, but straw is essential with clays liable to crack and warp in the earlier stages of drying. The wood cover transmits a good deal of heat on sunny days, and also allows more circulation of air along the top row of bricks than is admissible in such cases. Either wood or straw covers are conveniently made 1 yard in length and 3½ to 4 feet wide. This size is portable and easily handled without damage. The wood hack cover here illustrated (Fig. 8), is constructed of :—

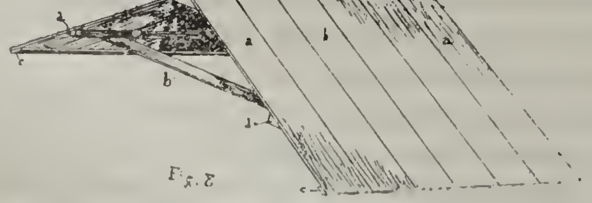


Fig. 8

11 boards 2ft. 3in. by 6in. by ⅜in. (*a*)
3 ,, 2ft. 6in. by 6in. by ⅜in. (*b*)
2 fillets 3ft. by 1½in. by ⅜in. (*c*)
1 ridge and 2 purlins (*d*) cut out of a batten 3ft. by 4in. by 1¼in., in the way illustrated by Fig. 9. Two of the boards, 2ft. 6in. by 6in., are nailed across from purlin to purlin as "collars" serving to hold the cover to shape and at the same time to support it on the hack of bricks. The third board, 2ft. 6in. long, projects at the ridge, forming a convenient means of handling.

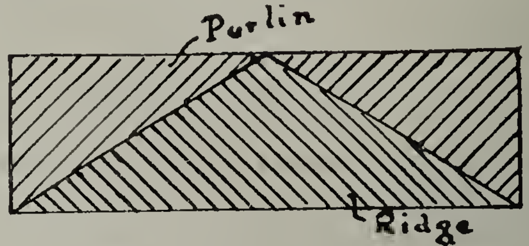


Fig. 9.

The wood for these hack covers, ready sawn and bundled, may be bought sometimes from firewood-timber merchants as cheaply as 10d. per set, but usually it costs 1/1 or 1/2 per set. The making up is worth from 2d. to 3d. each.

The hacks of bricks are also protected at one or both sides by sacks, mats or boards. The Petersburgh imported bast mats, 6ft. by 3ft., costing about 6d. each, are used largely for the purpose, keeping off sun and wind, but allowing passage of a moderate quantity of air.

Loo-Boards.

Boards for side protection of the bricks, called variously *Loo*, *lew* or *lewin*-boards are conveniently made in 6ft. lengths, 2ft. 6in. wide. Corresponding with the use of straw or wood covers, these may be made of straw or wood. For those made of wood, the top boards should be three-quarters of an inch thick, and the others half an inch. Two of the bracing ledges may be extended to a length of 3ft. 6in. to form legs as shewn in Fig. 10. They should be 3in. by 1½in., and the middle one 2in. by 1½in.

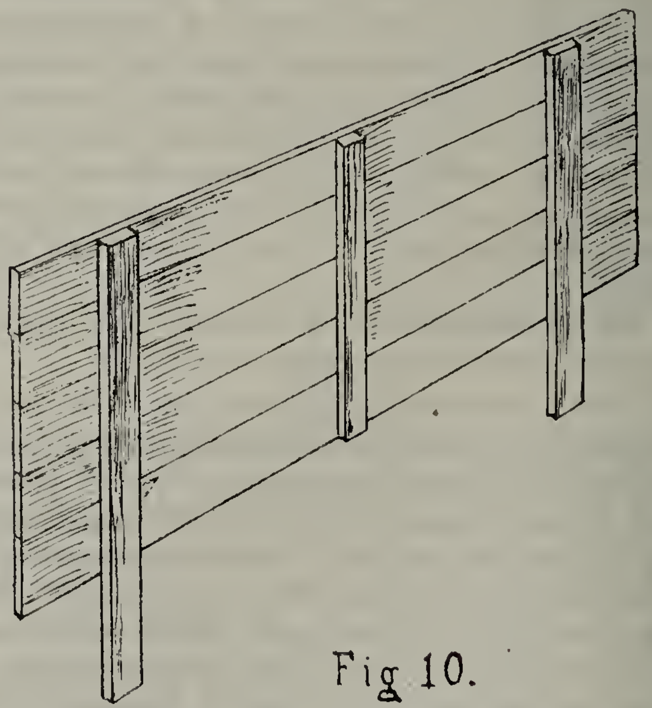


Fig. 10.

Such are the usual provisions for protection of bricks against weather on an open hack ground. For a common brick they have the merit of cheapness and portability, and in winter they can be packed away under cover. The yearly repair bill is however a considerable item.

SKINTLING.

After a hack is filled 8 or 9 high, the bricks are allowed sufficient time to become stiff enough to handle with one hand, a condition attained by hand-moulded bricks in one-third to one-half of the time required for complete drying. On reference to the diagrams given in our previous issue (Figs. 2, 3 and 4, pp. 316, 317 and 318), it will be seen that shrinkage is nearly complete by this time and danger of cracking is practically passed. The bricks are then *skintled*, with the exception of the two or three bottom rows which are considerably drier than the upper ones. A short portion of the hack being cleared at one end, the bricks are picked up, one in each hand at a time, and set on the cleared space diagonally on the blade, and one inch apart. The bricks in one row are crossed now at right angles by those in the next, and the hack is set one brick higher to allow for the additional space taken up. Fig. 11 illustrates this practice in plan.

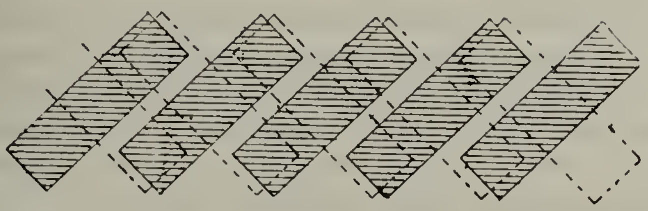


Fig 11.

The hack does not after skintling require so much protection against wind and sun, and both covers and loo-boards may be removed during the daytime on fine days.

SKINTLING FOR PRESSING.

When hack-dried bricks are to be pressed, the skintling must be done at an earlier stage. The bricks must be handled one at a time with both hands, and the end originally next the pathway turned inwards for the double purpose of preventing that end from much further stiffening, and of obtaining an increased stiffening of the end previously turned inwards. A day or two later the bricks will attain a fairly uniform consistency suitable for the pressing operation, after which they are again set in skintle for final drying. When hacking bricks intended to be pressed, it is advisable to stack them only six high, and to set the two bottom rows with common bricks which will not be pressed. Mats or sacks are also frequently used for protecting the outer ends of the bricks against excessive stiffening till they are ready for the press.

HACK-BOARDS AND TILES.

In damp situations the hacks are liable to remain damp for long periods so that an earth bed without other covering will not allow the bottom row of bricks to dry satisfactorily. *Hack-boards* or *hack-tiles* are then employed, with advantage, on which to set the blades of bricks. Hack-boards are made in long lengths, two boards 5 or 6 inches in width and from 1 to 1½ inches in thickness, being held together edge to edge by transverse ledges 3 inches wide and 2 inches thick at suitable intervals (Fig. 12).

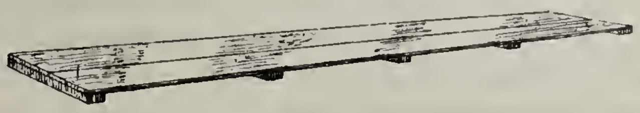


Fig. 12

Hack-tiles present distinct advantages over hack-boards, in that they are cheaper when home-made, are imperishable and do not require removal in winter. They can be made in an ordinary pipe machine in 12in. lengths, tubular, and 4½in. by 2½in. in rectangular section (Fig. 13).

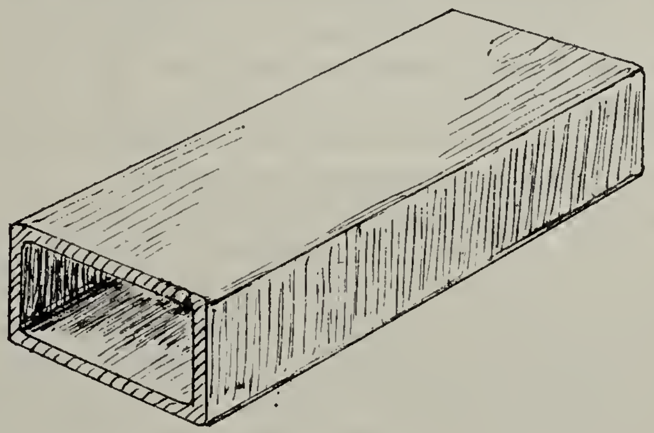


Fig. 13.

Sabine's Patent Steam Quarries, sold by Sutton & Co., of Overseal, are very suitable for the purpose.

If home-made and a little irregular it is well to spread a thin layer of sand on hack-tiles before setting the bricks on them. When drying common drain-pipes on hacks, nothing is better than a row of burnt pipes of the same diameter placed in a similar manner on the hack. Hack-boards or tiles allow a passage for air underneath the blades of bricks so that

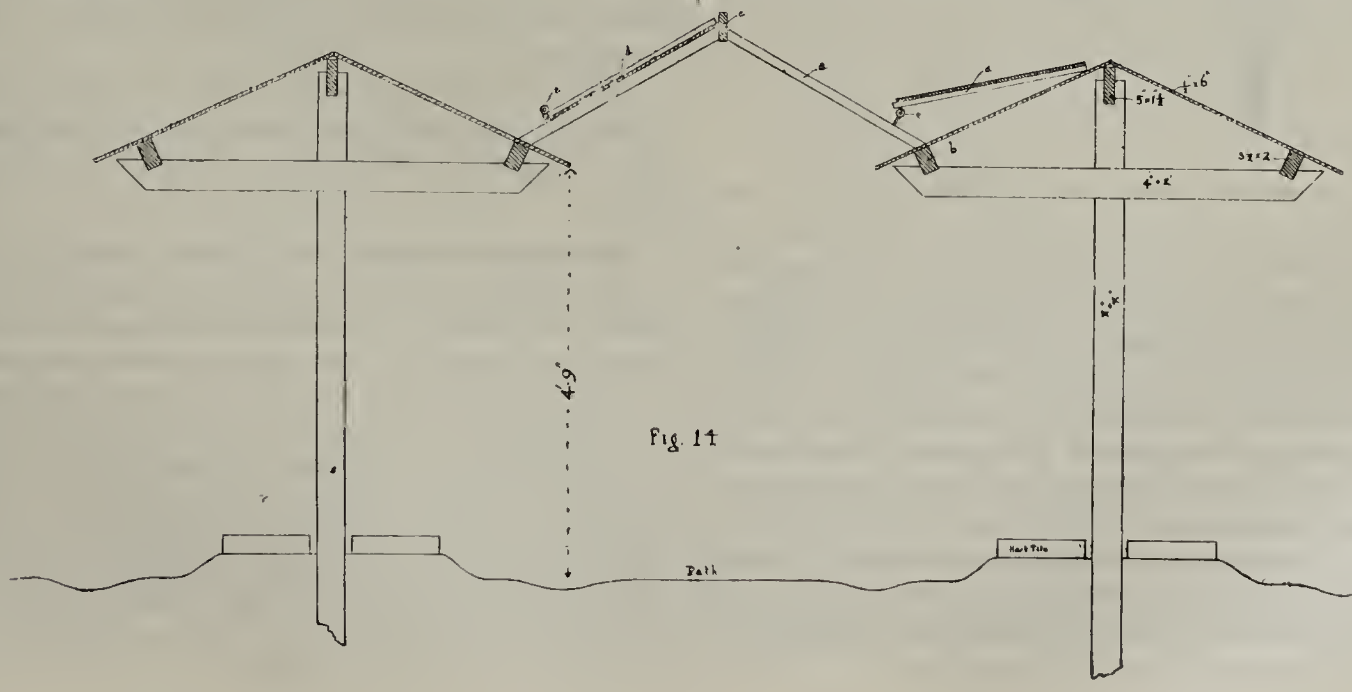


Fig. 14

damp air is not so liable to stagnate against the ground, and moisture is not drawn up from the ground by the brick.

ERECTED HACK ROOFING.

On permanent hack grounds it is frequently customary to fix the hack covering on posts at a given height above the ground. The roofing material may then be straw or wood as for portable hack covers, and in many yards common pantiles are in use. This last form has not much to recommend it, as the tiles are heavy and require adequate strength in the posts, framing and rips to support them. Preference should certainly be given to boarding about ½in. thick, which may be supported on framing as shewn in Fig. 14, the posts being placed 10 feet apart along the centre of the hack.

Erected hack roofing is best arranged with the hacks spaced about 9ft. apart from centre to centre. It is usual to board up both ends of each hack closely and the full width of the roofing. For the protection of the sides of such hacks against wind, sun and rain, loo-boards or mats may be used. There are many ingenious arrangements in use for the protection of bricks under erected hack-roofing. Mechanical devices have been introduced for raising or lowering the roofing itself and for performing similar operations with side shutters. These devices are, however, as a rule, expensive to erect and unsatisfactory in work. In consequence of long exposure to weather they are likely to become quickly deteriorated.

One of the simplest and most efficient methods is shewn in Fig. 14. A series of short rafters *a*, 2ft. 6in. by 3in. by 1½in. and 5ft. apart, are nailed at one end to the hack roof purlin *b*, and at the other to a light ridge *c*, 4in. by 1in., which is continuous throughout the length of the hack. Shutters *d*, hinged at *e*, rest on the rafters on both sides of the ridge when closed, with a narrow space for ventilation between their lower edges and the hack roof. Each shutter is made up of five boards, 5ft. by 5½in. by ½in., held together by three ledges, 2ft. 3in. by 1½in. by 1in. In order to be able to take off and store these shutters in winter the hinge is made up of two screw eyes, and a pin as shewn in Fig. 15 in detail. A pin is screwed to one end of a shutter and a short screw eye to the other. The long screw eye is screwed into the rafter. On putting the pin through the screw eye in the rafter, and the screw eye on the next shutter, a complete hinge is formed. These shutters may be easily manipulated according to necessity, either or both sides being open or closed. During storms when the shutters are closed the greater part of the rain drips off the shutters on to the hack roofing, and thence to the drainage trenches on both sides of the hacks. Driving rain, strong wind, and sunshine are completely and easily baffled from any direction. A hack ground equipped in this way provides very efficient protection to the bricks to be dried and ample ventilation. At the same time, the bricks are not damaged by contact with the covering or the side protection.

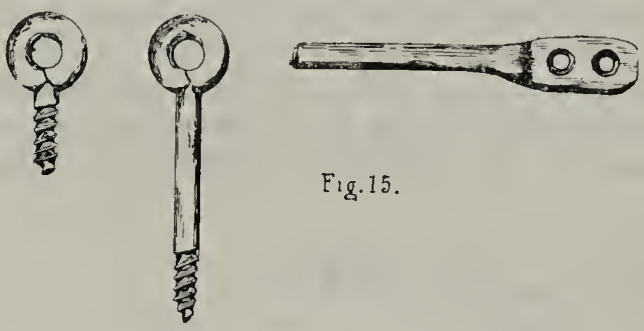


Fig. 15.

MECHANICAL DRAUGHT IN BRICKYARDS.

SOME FACTS AND FIGURES.

IN our December number the American Blower Company criticised our article on the above subject which appeared in the November number.

We now give below a careful analysis of actual figures obtained from the Hoffmann type of continuous kiln, with advance drying of the newly set bricks. These are not the only figures we have on the subject but are representative ones.

A Sercombe kiln burning a common brick of bastard fireclay was turning out well-burnt bricks at the rate of 55,000 per week, or 5½ bricks per minute. In one minute the main flue was delivering 186 lbs. of gases of combustion at a temperature of 205°F. Weight of bricks when burnt, 44 lbs.; coal consumption, 1·54 lbs.; water dried out of bricks in kiln, 3 lbs.; external temperature of air, 40°F., taken as being saturated with moisture. The resulting gases so far from being "moist" would not reach saturation point till reduced to 78°F.

The heat carried away by the chimney was 38 per cent. of the total heat produced by the coal. Of this heat about five-eighths could be recovered for drying purposes, and would be equal in effect to the consumption of 6 cwt. of coal per day.

This quantity of coal should dry about 4,000 bricks per day, or 28,000 per week, just half the quantity being burned in the kiln.

These figures are suffiicient to bear out our original contentions. The fan is not liable to corrosion from moisture. An iron stack is quite a different matter because the iron transmits heat so rapidly that in a long stack the gases might be reduced to saturation point. We may point out, however, that sheet-iron stacks are in extensive use in India on Bull's patent kiln (a firm of temporary Hoffmann).

With regard to oil engine running, the one mentioned as being employed at Mr. James Brown's works, at Chelmsford, has been working since August, 1898, with only temporary interruptions. There is no objection, even when in full burning, to short stoppages of the fan for cleaning or repair, and a duplicate installation is quite unnecessary.

It may be objected that 205° is a high temperature for the escaping gases from a Hoffmann kiln. From a simple Hoffmann they are usually somewhat lower than this, but where advance drying is used (as it always should be) this is a medium temperature.

We repeat emphatically that the question, in these days of expensive coal, is of great importance, and the firms who install drying systems would do well to devote some careful attention to it.

The Cement Trade in 1899.—Messrs. Tulloch & Co., of 4, Fenchurch Avenue, London, E.C., send us their Annual Cement Trade Report just issued. They remark that the year just closed has been a record one in the trade. In all large producing countries, namely, the United Kingdom, Germany, Belgium, France, and (last but not least)—the United States, supply has barely kept place with the demand. In Great Britain the trade has had a prosperous year, but the high cost of fuel and labour has reduced the margin of profit. There are good prospects for 1900; stocks are not heavy and the building trade continues healthy. British exports of cement in 1899 were 353,615 tons as against 325,674 tons in 1898. Messrs. Tulloch estimate that the imports of cement into this country in 1899 were not less than 120,000 tons, chiefly from Belgium.

THE SEPARATION OF STONES FROM CLAY.

To the Editor of "The British Clayworker."

Dear Sir,—When your article on the above-mentioned subject appeared in your December issue I had not intended replying, although there were inaccuracies in it which would lead your readers to believe that our method was a costly one. The inaccuracies I refer to are :—

1. You put the cost of water for washing clay at 6d. per 1,000 gallons, or say two shillings per 1,000 bricks.

The cost of water at our works is one shilling per 1,000 gallons, which is just double your estimate.

2. You estimate the cost of fuel to dry the clay to work by our method at five shillings per thousand bricks.

As a matter of fact, the drying of our clay costs us nothing, as part of it is dried on the top of our kiln, and part on a shed floor heated by our exhaust steam.

The real cost to us is the filling and emptying of our clay after it is dry, but as we only dry half of it (the other half going in straight from the pit) the extra cost can easily be arrived at.

Judging from letters which I have received from several firms, it would appear that a considerable number of brickmakers are interested in the subject, and probably this letter may help to throw a little light on it.

I will begin by saying, that when we patented our machine, it was merely as a protection, and the idea of selling it to others did not then appeal to us.

And now to my subject.

When one has to study the problem of dealing with stones in clay, several things must be taken into consideration amongst others :—

1. The percentage of stones.
2. The size of stones.
3. The kind of stones.
4. The best method of dealing with them.

I found that we had :—

1. Over 50 per cent. of stones.
2. They were of various sizes, but principally small ones, say from the size of a marble downwards.
3. They were nearly all limestones.

With regard to the fourth heading, this is the pith of the subject. Had the majority been large we would probably have picked them out in the pit and left them there, sending the smaller ones with the clay to be either washed or crushed.

Unfortunately, the small size of our stones debarred us from using either of the above methods, and for the simple reason, that to wash clay with 50 per cent. of small stones in it would have been very costly, not only for water, but for labour in cleaning out the washmills, and as we could not pick the stones out in the pit owing to their small size, we had either to crush the whole 50 per cent. of them with the clay or find some other way out of the difficulty.

Obviously it would be foolish to think of crushing such a quantity of *limestones* to mix with the clay.

Being debarred therefore from either washing or crushing, our present method was decided on, and our machine certainly performs its work well. It is simple in construction, easily driven, and costs little.

A comparison between the cost of washing and our method can be formed by taking into account the following items :—

Washing.	Our Method.
Cost of water for washing.	Cost of filling and wagoning *half* the clay used from top of kiln or shed-floor to machine.
Cost of cleaning washmills and carting stones away either to be re-washed and made fit for sale, or to be tipped on waste heap.	The stones after going through our machine are clean enough for sale.
Cost of filling and wagoning clay, when ready for use, from settling tanks to brick-machine.	

It must also be borne in mind that settling tanks, to give a supply of clay to make, say 20,000 bricks per day, would require to be of great length, which must be thought of when calculating the cost of wagoning clay to the brick-machine.

Yours truly,
Robt. A. Rossborough.

[Mr. Rossborough has, unfortunately, read our remarks somewhat too superficially; from reference, he will find our comparison of cost between water for washing and heat for drying was as 2s. to 5s. for *ten* thousand bricks.

When water is naturally abundant, it will cost much less than 6d. per thousand gallons, and we know of factories which are supplied by water companies even at 4¾d. per thousand.

If clay is dried on a kiln or on a steam floor it *is* costing money to dry it, for the space occupied by it might otherwise be employed in drying manufactured bricks.

If it is only necessary to treat mechanically half the clay used, similarly it would be only necessary to wash half the clay.

Mr. Rossborough's minutiæ are, unfortunately, not sufficiently minute, and need actual figures to support or demonstrate them.

Obviously, we do not wish to object to the mechanical method in the case Mr. Rossborough mentions of a clay which has 50 per cent. of small stones in it. For our own part we would have nothing to do with such a clay. Our original notice, however, was intended to show the necessity of great caution in approaching the question, and the note of our correspondent in our January issue still further emphasises this necessity while going into more detail and giving examples of practical experience.]

Death of a Leicester Brickmaker.—The death occurred last month of Mr. William Whetstone, of Broom Leys, Coalville. The deceased gentleman had been in precarious health for some time, and it is understood that death was due to general debility, he being 87 years of age. Mr. Whetstone was one of the oldest inhabitants of Coalville, and commenced business as the proprietor of the Encaustic Tile Works. On the death of his brother, Mr. Joseph Whetstone, he owned the Whitwick and Ibstock collieries, both of which he subsequently sold to limited liability companies. His eldest surviving son is Mr. Frederick Whetstone, who is a barrister and a Justice of the Peace for Leicester county.

PORTLAND CEMENT MANUFACTURE.

NOT all clayworkers are perhaps aware of the principles of science and art which are extensively used in connection with the manufacture of Portland cement—and, hence, a few remarks upon the general mode of procedure may prove interesting.

Portland cement—with its ever-increasing and now remarkable utility—is a chemical product obtained by the preliminary mechanical combination of carbonate of lime with silica and alumina; which, after passing through the succeeding chemical stage of manufacture, may be described as a double silicate of lime and alumina.

To bring about, however, the satisfactory results now so essential to ensure the ready demand for a first-class quality material—the laboratory is always a place of importance in the largest and best cement works of the present day, for especially is a thorough knowledge of chemistry necessary with manufacturers having to contend against a variation of composition such as is found, for example, in the natural marls of Cambridgeshire.

In procuring, and ensuring also, the ultimate quality of Portland cement, a fixed quantity of chalk and clay has first to be efficiently and accurately amalgamated, either by the addition of water to the raw materials, or by the fine grinding and mixing of the same in its dry state.

The chemists' services are then requisitioned, and before the mixture is further dealt with, the chalk and clay in its amalgamated state is subjected to a strict analysis.

It may be stated roughly, that after the intimate blending of the raw materials an analysis would shew:—

Carbonate of Lime	74·85
Silica	16·45
Alumina and Oxide of Iron ...	7·25
Alkalies, etc.	1·45
	100·00

and if a deficiency of either chalk or clay is found, the standard composition must necessarily be accurately attained before the further process of manufacture is carried out. In the laboratory, therefore, a free use is made of the calcimetre, by which a speedy and almost accurate result of the amount of $Ca\,C\,O_3$ is obtained in this way.

A sample of the raw material after being mixed is enclosed in a bottle attached to the calcimetre, and to this is added a solution of hydrochloric acid, thus the amount of carbonic acid gas given off is registered, and the result is shewn by an equation, comparing this amount of gas with the gas given off from a proportionate quantity of Iceland spar (calcium carbonate); but for the more correct and complete analysis, however, the usual fusion and precipitation is adopted.

After thus passing the scrutiny of the chemist, the mechanically mixed raw material is then converted into the requisite chemical compounds by calcination, and for this stage the raw material is prepared in convenient blocks, and burned with coke, in kilns, until heated to a point of slight vitrifaction.

The calcined product—clinker, as it is then called—is pulverised and ground to a powder sufficiently fine to enable the cement to pass through a sieve having at least 2,500 meshes to the square inch, and of a resulting cement the following is an analysis:—

Silica	24·53
Alumina	7·50
Oxide of Iron	3·31
Lime	62·50
Alkalies, &c.	2·16
	100·00

For testing the finished cement when thoroughly cool, a sample is prepared with the addition of water into small briquettes, which are moulded in such a way that the dimension in the centre of the briquette is exactly one square inch, and after an interval of 24 hours, the time allowed for the full setting of the cement, the briquette is immersed in cold water for, usually, about six days.

By placing the briquette in a machine specially provided for the purpose, the tensile strength and quality of the cement is readily obtained—briquettes having a minimum section of one square inch usually bearing a strain of from 400 to 500 lbs. at the age of seven days.

A CONTRACTION RULE FOR CLAYWORKERS.

WE have received a steel contraction rule from Messrs. F. & H. Shaw, Ltd., Hebden Bridge, Yorks. It is 24 inches long, and divided very clearly on two edges into inches and sixteenths. The contraction allowed for is three-quarters of an inch in a foot, so that 12 inches on the rule is actually 12¾ inches.

As a specimen this rule is excellent, being well finished, strong and distinctly marked. The contraction on this particular one, however, is hardly representative as very few clays shrink less than one inch to the foot.

Some brickmakers are inclined to favour the use of proportional dividers for adding shrinkage, but a contraction rule is simpler to use and very reliable when one kind of shrinkage only has to be dealt with in a brickyard.

The Dangers of Blasting.—A sad fatal accident occurred on Feb. 8th, at Messrs. D. Sharratt & Sons, Stoath Brickworks, Elland. Two men, named Sam Brook (42) and Alfred Stott (37), were engaged in the clay mine preparing for a blast. Brook was ramming a charge of dynamite with a piece of wood, when the dynamite suddenly exploded, and Brook was so injured about the head and body that he died shortly afterwards. Stott was also badly injured, and was removed to his home. The deceased was married, and leaves a wife and two children.

Interesting Discovery at Wellingboro'.—An unusual discovery was made at Messrs. Thompson Bros.' brickworks, Wilby, recently. The workmen were removing the soil which covers the clay, and when only a little distance from the surface they came across the skeleton of what was at one time undoubtedly a human being. As soon as it was brought to the surface the structure dropped to pieces, the bones being in a crumbling state. The skull, however, retained its shape, with the exception that the jaw was broken where one of the workmen struck it with his pick-axe. The skeleton is believed to be that of a female, this view being strengthened by the fact that around the wrist-bone there was what were apparently at one time several bangles. The affair will no doubt remain a mystery, but the fact that the body was discovered only about a foot and a half below the surface of the ground goes to show that it was probably put away in a hurry, and that there had been foul play.

THE DRYING OF BRICKS MADE FROM COLLIERY SHALE.

THE "SUTCLIFFE" CO.'S INSTALLATION AT CRAMLINGTON.

IN many instances, where it is proposed to instal brick manufactories or to increase the output of existing brickyards, the great space occupied by hack grounds or drying sheds is a drawback sufficiently serious to render the adoption of the tunnel system desirable, if not imperative.

This remark applies perhaps more forcibly to the production of common bricks than to any other kind of ware, though there are many points in favour of the adoption of the system for all the better classes of plain bricks and tiles. Nearly all kinds of clay may, with proper precautions and with scientific consideration of their characteristics, be dried in tunnels within 60 hours. Most kinds can be dried in them in considerably less time and many installations are actually in use at the present time which turn out dry sound bricks in 24 hours, from the moment of manufacture.

A single tunnel, 100 feet long, covering a width of 5ft. 6in., will contain when filled about 5,000 bricks, and will therefore give an output of that quantity per day if the clay will stand rapid drying. As the tunnels may be worked continuously at all seasons, one may calculate on at least 250 working days in a year. To produce a million bricks, therefore, will require no more than one tunnel, and an immediate and striking difference is seen between the space it occupies, compared with the acre of ground necessary for the same output on hacks. The older method will be found minutely described in our second article on "Brick Drying," published in this issue, and some idea of the extra labour involved by it can also be formed. In contrast with this, in the tunnel system the bricks are not handled from machine or moulds till they reach the kiln.

Prominent among the various systems of tunnel-drying now in the market is that perfected by the Sutcliffe Ventilating and Drying Company of Manchester, which has many installations now in successful operation.

By the courtesy of Mr. Morrison, Manager of the Cramlington Coal Company, Limited, we have been permitted to inspect the latest installation of this system at Cramlington, near Newcastle-on-Tyne. It is drying stiff-plastic bricks, made from the shale output of the several collieries under Mr. Morrison's management. The shale is made up in a complete installation of the American "Raymond" machinery, dried in the Sutcliffe tunnels and burned in the Osman "New Perfect" kiln. An excellent pressed brick of a bastard fire-clay nature is produced and is a particularly good example of the modern working-up of colliery refuse, efficiently dealt with and rendered valuable.

The tunnels are six in number, separated from one another by 9-inch brick partitions, and covered with 6 inches of concrete. Each tunnel 5ft. 6in. by 3ft. 6in. in cross section, contains a single line of rails, and holds 14 double deck cars with roller bearings. An incline of 1·4% given to the track proves rather more than is requisite for these cars, but is not so much as to prove objectionable in working.

The heat is provided by live steam, supplied at a pressure of about 50lbs. to the square inch to a tubular heater, 11ft. long, 5ft. 6ins. in diameter, and containing 200 tubes of 2¾ inches internal diameter. On the occasion of our visit we found the heated air for drying entering the tunnels at a temperature of 175°F. and leaving them at the further end reduced to 90°F. It was so heavily charged with moisture from the bricks, that "steam" was formed on coming in contact with the external air at 50°F. These temperatures very closely approximate to those found by scientific calculation to give the maximum of efficiency for drying purposes, and may be considered as a practical proof of the care with which the details of the dryer have been worked out. The hot air is admitted by means of sheet-iron-ceiled conduits extending 50ft. along under the floors of the tunnel. An inlet into each tunnel is provided 4ft. from the hot end, of 4 sq. ft. area. A second one at 25ft. from the end is of 3 sq. ft. area, and a third at 50ft. of 2⅓ sq. ft.

The determination of the position and area of these hot-air inlets is of the first importance, and must be carefully decided by an expert according to the nature of the clay.

At the time of our visit, the machinery had not attained full efficiency, and was giving an output of 16,000 bricks daily, instead of the proposed quantity of 20,000 to 25,000. We, ourselves, weighed the bricks before and after drying, and found an average of 14 ozs. loss of water per brick. This corresponds to an evaporation of 582¾ lbs. of water per hour, and we were assured that it was effected by a condensation of 700 lbs. of steam in the tubular steam heater in that time. This also may be considered a very efficient performance, and corresponds roughly to a consumption of 1·34 cwt. of coal per 1,000 bricks dried. We may take occasion here to point out that the actual expenditure of fuel must depend in every case on the amount of water to be evaporated, and it is useless to accept figures obtained in any one case as applicable to another.

A 60-inch Sutcliffe fan forced the air through the heater into the tunnels, and was running at the low speed of 190 revolutions per minute, considerably under its minimum tabulated rate.

About 1,800 cubic feet of heated air was being delivered to each tunnel, also a low quantity corresponding with the temporarily low output. The fan is driven by a direct-coupled engine, a wasteful but convenient form of power transmission.

The resulting bricks were perfectly dried and quite sound, and free from cracks of any kind, and we may certainly express every satisfaction with the results obtained, after the most careful examination and testing of them.

The Sutcliffe Co. instal their tunnels also with coke heaters, of tubular or slab form ; in common with those most experienced in drying systems they prefer however steam heating, as being more regular and more under control, and but very little more expensive to run. Exhaust steam may of course be used, and will effect a considerable economy of fuel where large powers are employed.

With their system, and though not differing greatly in general design from others in the market, it is apparent that with such careful adaptation as is evidenced at Cramlington, the Company may take high rank among drying engineers.

IMPROVEMENTS IN BRICK-MAKING MACHINERY.

ALTHOUGH brickmaking by the semi-dry process is not to be recommended except in special cases, it is interesting to notice developments in mechanical means for all classes of brick production.

The machine here illustrated, recently patented by Mr. Andrew Kesson of Glasgow, is undoubtedly well worked out and would appear capable of good results. It bears some resemblance in general principle to some of the well-known coal-briquette making machines.

The inventor claims the following points in his invention :—

In combination with a rotating body or wheel :—1, hollow spokes which carry moulds and compressing pistons working within them ; 2, means for actuating the pistons ; 3, a device for charging the moulds ; 4, means for effecting the charging ; means for closing the moulds automatically.

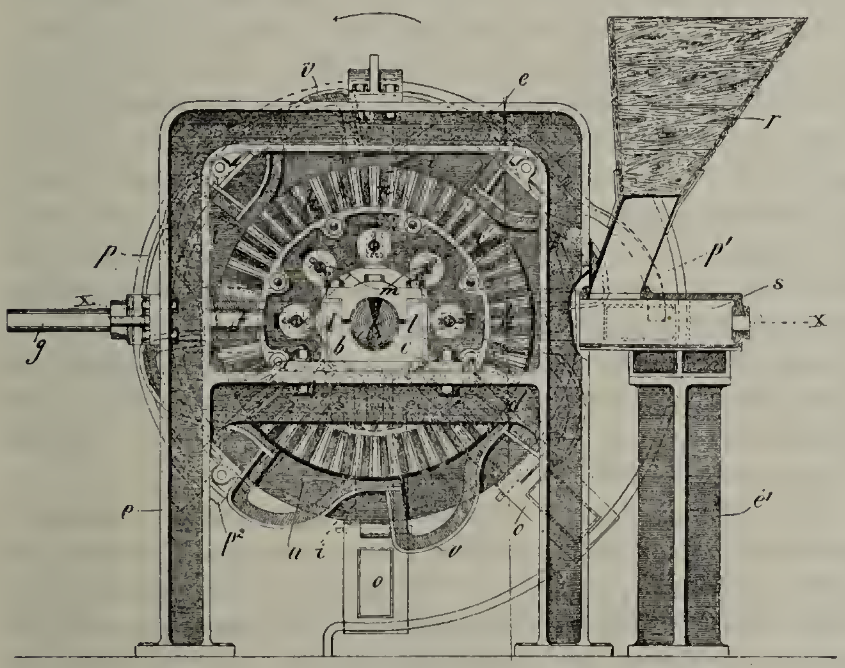


Fig. 1

Fig. 1 shows a side elevation, and Fig. 2 a central horizontal section. The latter shews the working parts more clearly, as the prominent curved lines *v* on the side view are somewhat confusing. These are the guides employed to actuate the device for filling the moulds.

The main shaft *b* carries the rotating wheel *a* which is actuated by means of the bevel wheel *h* and pinion *f*.

The hollow spokes or arms *i* (8 in number) of the wheel, each have a hinged lid *o* which is automatically closed at p^1 as the wheel revolves and is held closed by the contact of the roller *q* with the curved race *p*. Inside each spoke is a piston *j*, fixed to a rod *m*. The pressure is given to the piston by the action of the small rollers *l* as they pass over the excrescences 2, 3, 4, 5, and 6 on the fixed cams *k* (Fig. 3). Thus five graduated pressures are given to the brick which is discharged from the mould by the excrescence 7, when the spoke reaches its lowest position. As the curved race *p* ends at p^2 the mould lid is then automatically dropped open.

So much for points 1 and 2.

To charge the moulds a hopper *r* filled with prepared earth connects with a chamber *s* in which a piston *t* is pushed home towards the mould by the spiral spring *u*.

As the mould rises from its lowest position, the curved angle iron guides *v* act on the ends of the rods *x*, and push the piston back. Earth drops from the hopper *r* into the cylinder *s*, and then the piston rods are suddenly released by the straight part of *v*, and the piston thrusts the earth into the mould.

The curved race at p^1 then again closes the lid, and the mould-piston receives again the successive thrusts as the wheel revolves and the brick is compressed.

Fig. 2

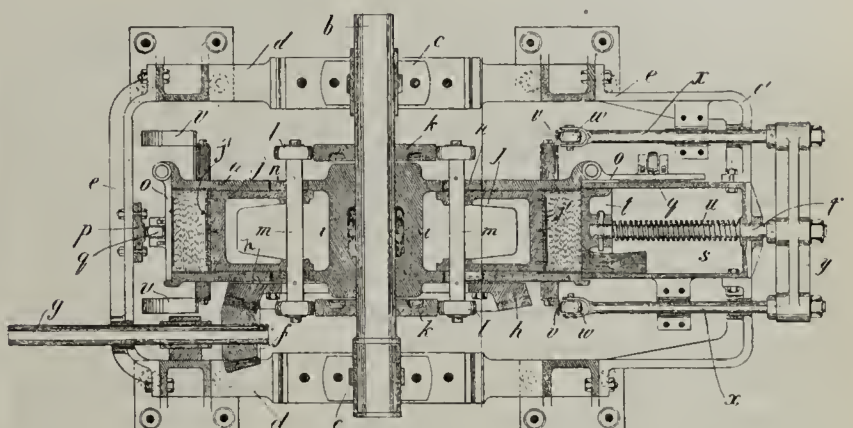
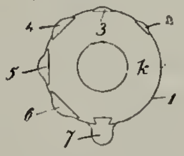


Fig. 3.



There is no evident means for withdrawing the pistons after each discharge of the finished brick, though doubtless this is provided for. We consider, however, that a serious point is overlooked in adjusting the excrescences on the cam *k*, so that the pressure to every brick in the wheel is given at the same instant. This must lead to undue and jerky strain on the machine and driving belt, and necessitate a larger driving power. The pressures throughout, too, are dead pressures, and necessitate a very uniform amount and condition of clay supply. No means of adjusting the quantity of earth supplied is shown. There is a great number of wearing parts, and the machine, in our opinion, would need extended practical trial to prove its value.

Cement Making at Barrow.—Some few months ago we announced the proposed erection of cement works in Ainslie Street, Barrow, by the Western Counties Cement Co., of which Mr. Wood, builder and contractor, Withington, Manchester, is the principal. We are now able to state that it is expected the works will commence in about a month's time. The object of the company is to manufacture cement, slag paving, &c. They intend to take over the slag bank, break it up and mix it with cement, put in stone presses, and eventually convert it into artificial flags. We understand it is not the intention of the firm to confine their business to local demands, but rather to extend it as much as possible both in England and abroad. The total weekly output at first is estimated at about 700 tons, but before the expiration of twelve months, by which time the extensive plant will have got into more thorough working order, it is anticipated the weekly output will advance to 2,000 tons. Hydraulic lime, paving bricks, railway sleepers, and basic manure are among the many things to be turned out by the company.

QUERIES AND REPLIES.

Would the fire-clay, of which the following is a chemical analysis, be suitable for the manufacture of buff facing bricks (not glazed), such as are often used in buildings at railway stations?

Silica	71·5
Alumina	16·0
Iron oxide	2·5
Calcium carbonate	0·3
Moisture and organic matter	9·7
	100·0

Also would it require any other ingredient to be mixed with it to produce the desired result?—BUCKINGHAMSHIRE.

There can be no doubt that this clay would make an excellent brick, but whether it would turn out of uniform buff colour could only be determined by actual experiment. The proportion of iron oxide is rather high for a light buff, and presuming that the clay is to be hard burnt it would possibly be somewhat speckled with minute brown spots. For a light buff (which seems to be the tint contemplated), and bearing in mind the proportions of silica and alumina indicated, we would rather see the iron down to about one per cent. However, a very great deal depends on the hardness of the burning as to what would be the actual tint of buff. Burned at a low temperature not long sustained we should expect to see this clay turned into a brick having a fine surface and of a reddish-brown surface tint. At higher temperatures it would doubtless turn bluish. We do not think anything within a reasonable quantity could be added to this earth to neutralise the effect of the iron, as the latter is such a powerful colouring ingredient. If the iron were present as iron disulphide (of which there is no evidence in the analysis) it might no doubt be removed by washing; and if as grains of limonite it could be largely eliminated by an electro-magnet, but we do not recommend either of these processes to our correspondent—in the present instance.

Is this same fire-clay suitable for the manufacture of white glazed bricks?

We believe it would do well for that purpose, but we could have given a more decided opinion had the relative proportions of moisture and organic matter been stated in the results of the analysis. In any case, we assume that the goods are most carefully dried before being burned, and that the latter process results, in consequence, in the non-production of cracks. We have not a sample of the material before us, the surface after being burned would doubtless not be very rough.

PROSPECTING FOR BRICK CLAYS.—*Can you tell me the best method of discovering the presence of clay upon a property, and whether one can do his own boring?*

It is always best for many reasons to employ an efficient man to undertake boring operations, but there is no reason why anyone should not do his own boring, if he is so disposed.

When a brick-earth appears at the surface of the ground, the prospector has no difficulty in recognising it as a rule. But, when that earth is covered over by a thick, matted vegetation, or by a thin superficial deposit so that the actual existence of the brick-earth could not be proved, perhaps, except by an experienced field geologist, the prospector has to resort to artificial means to demonstrate its existence.

In a new country the existence of the purer clays may frequently be suspected in those districts where granite occurs, especially if the granite is seen to be well weathered, and better still if it is absolutely soft and rotten. Low-lying land between hill sides, or a flat stretch alongside a ridge very often indicates clay, no matter what may be the actual nature of the hills and ridges near by. A great deal may be learned in this direction by climbing the nearest hill towards evening. In many instances it will then be found that looking over the flat or slightly undulating ground a mist rises. Carefully regarding the haze it will be found, perhaps, that it is not spread as an uniform mantle over the plain below, but is thicker at one spot than at another, and, indeed, the mist may be altogether absent from certain well defined areas. Noting these various points it will, in the vast majority of cases, be discovered that those spots over which the mist lies have clays at or tolerably near the surface of the ground. The distribution of the mist, therefore, is an important factor to the prospector after brick-earths. But, as we have before said, this class of knowledge is of the most use in a new country.

So far as Great Britain is concerned, we now know the composition of the ground so minutely that rough prospecting of that class is no longer necessary. At the same time we can aid that knowledge very considerably by making local examinations more carefully than they have been done officially, always, of course, from a brickmaking standpoint. The usual method adopted by the brickfield explorer is to dig a number of deep holes large enough for at least one man to work in. Failing at one point, a hole is dug elsewhere, and so on until these preliminary investigations have cost quite a little sum of money. Not long since we went over a property of about 250 acres, and the owner desirous of starting a brickyard had retained the services of four men who had dug no fewer than fourteen holes, varying from 10 to 18 feet in depth! The amount of needless work done was simply appalling. True enough the sides of the holes were easy to inspect, but there was no necessity to have done so much work.

The geological surveyor desirous of exploring a property such as that, would take with him a boring instrument of a special character, and with the aid of one or two men would be able to put down from twelve to fifteen borings a day in fairly satisfactory ground, to an average depth, say, of 15 feet per boring. When desired, any single boring can be carried out up to and beyond 30 feet in suitable ground such as may reasonably be expected in fields where the existence of brick-earth may be suspected. About four or five borings to that depth may be executed by two men in one day. The special feature of the apparatus, which is Belgian in origin, is that, acting like a cheese-taster, it provides samples of the earth met with in the borings so that the prospector knows the kind of ground passed through quite as well as if a great hole had been dug. Where pebbly or stony clay exists, or where a gravel bed may occur, the apparatus is still available. The boring end is so arranged that different kinds of boring tools may be affixed to it depending on the nature of the ground to be dealt with. In the case of gravels, samples of which are not, perhaps, desired, an auger-shaped tool is employed—but we will not attempt to describe the accessories. Suffice it to say that the apparatus and all its accessories may be carried quite easily by one man, so that no cart, horse, or other means of conveyance is required to carry the borer from spot to spot. There is no reason whatever why the clayworker should not have one of these borers when he is of a prospecting turn of mind—it costs only a few pounds, and no specially trained skill is required in using it.

GREEK TERRA-COTTA STATUETTES.

A GREAT deal has been written, especially on the Continent, on the statuettes which play such an important *rôle* in the houses of the ancient Greeks, but it is doubtful whether any monograph on the subject excels this one by Miss Hutton. The archæological interest evoked by the statuettes is not only incorporated, but they are also considered in an æsthetic sense. The vast majority of these relics have been taken out of tombs, but many are found on the sites of temples and houses. Those found near old temples seem to lend colour to the statement made by certain ancient writers that terra-cotta figures were dedicated in temples. The objects fall into two classes, viz :—those which were connected in some way with temple worship, and those which were not. Our information as to the use of terra-cotta figures in private houses is based entirely on the excavations at Pompeii ; but, by the year A.D. 79, when that city was overwhelmed, these statuettes had already gone somewhat out of fashion.

Miss Hutton is careful to deal with the ancient Greek methods of manufacturing terra-cotta figures. Their makers were not regarded as artists, though they were elevated rather above the rank of mere craftsmen ; the cheap reproductions of the Greek potter were for the many, and his one aim was to hit the public taste. There were two ways of making these figures ; modelling by hand, and casting from a mould, of which the former process is the more ancient. The earliest human figures found are simply slabs of clay with a triangular lump at the top for a head, and two fin-like appendages for arms ; seated figures were made by bending the clay and placing a support beneath it, standing ones by thickening it at the base, so as to form a cone or wedge. The first improvement effected is to stamp a face on the upper part of the clay, and to round off the top roughly in the form of a head ; the next to use a stamp for the whole of the front of the figure, and we thus have a solid lump of clay with the figure embossed on it. The author is of opinion that the practice of moulding figures instead of stamping them, arose from the difficulty of firing a solid lump of clay without warping it. Many of the moulds used in the manufacture of statuettes have been found, so that we are well able to judge of the methods employed. The mould was made of clay baked very hard, and into it the workman carefully pressed a thin layer of fine moist clay, adding others until the requisite thickness was obtained ; the mould was then set to dry, and the shrinkage produced by evaporation, soon allowed of the cast being removed from it.

For the commonest class of figures a mould is used for the front only, and the back is formed by a convex mass of clay cemented to the front portion so as to form with it a rough cylinder ; for the backs of the better class of statuette there was a second mould. Other figures were produced by a number of moulds being employed—even up to the number of thirteen for one figure. After the statuette had been put together and before it was fired, it was subjected to a very delicate and skilful process of retouching, in fact this process has occasionally been resorted to so freely that the mould can only be said to have given broad features to the statuette. To avoid risk the figures were fired at a very low temperature, and for the same reason a hole was cut in the back to facilitate evaporation. After the firing any accessories (previously burned) were stuck on. The whole figure was next coated with a white lime-wash, the object being to make a medium for the final decoration in colour. In reference to the latter we do not often find a statuette in which the original tints are well preserved, but enough remains to show that the scheme of colour was a brilliant one in which red and blue predominated. There are some excellent coloured drawings in the book telling us what the schemes were actually like.

There cannot be the slightest doubt that this method of gaudily painting the terra-cotta vastly depreciated the value of these works in an æsthetic sense, though our author does not view the matter in that light. Nobody could look at the fine figure of a "Cup-Bearer" (plate vi.) without feeling disgusted at the effect of the paint. Indeed some of the more learned men amongst the Greeks seem to have felt so too ; for Lucian tells us of a Greek who, in advising a friend to cultivate solid learning, says, "otherwise you will be like potter's work, all blue and red outside, and all clay and rubbish inside." It would have been far better if the statuettes had been left alone.

We have no space to review the chapters dealing with the purely æsthetic side of the question, but it is treated at great length in the book. The excellent drawings and other illustrations serve to show how wide a field the statuettes covered. From their mode of "manufacture" we cannot expect to find anything comparable with the sculpture of the periods of which they are representative, and we are not altogether smitten with the beauty of some of them. They are well worth a study by modern artists in terra-cotta, however, and they have this peculiar charm that the best of them do not look like mere burnt clay, they are not stiff, but seem to possess life—that cannot be said of many modern terra-cotta figures.

THE FIREPROOFING OF FLOORS.

THE following is an abstract of a paper read by Mr. J. H. Blakesley, M.A., A.M.I.C.E., before the Civil and Mechanical Engineers' Society, on December 7th. The subject of fireproofing being such a large one, it is desirable to restrict the observations in this paper to a small branch of the subject, and as a very exhaustive historical account occurs in Vol. cv. of the "Minutes Institution of Civil Engineers," in a paper by Mr. Webster, it is deemed advisable to merely review a few typical structures here in their relations to the general principles to be followed. Progress in these inventions has been retarded by the growing necessity for cheapness, which is not counteracted by occasional fancy specifications. Chief objects in fireproofing should be to adapt the protection to the actual needs of the building, so as not to increase cost unnecessarily, to avoid thrust on the side walls, and depth or thickness of floor, which increases the amount of brickwork in the building ; and lastly, strength in proportion to the weight of the floor. In most cases the floor between the supporting joists is stronger than the joists themselves, and any great excess of such strength over that of the joists is therefore superfluous.

With regard to materials, hydrated cements should be avoided when exposed to very fierce heat, though usefully employed when covered by more refractory substances. The advantages of porosity are generally non-conduction of heat and lightness. The disadvantages are the liability to the generation of stresses in the pores when the heated substance is played upon by cold water, and consequent rupture. Maurer's and Wright's bricks are highly porous, and in some cases have shown good results. Coke breeze concrete is another, but of variable fireproofing power, according to quality, and some sorts apparently make better fuel than fireproofing material. There is a danger in the best non-conducting substances, owing to the stress produced by suddenly cooling the surface, which is likely to cause rupture ; and here a hydrated plaster may with advantage be used to protect the principal structure from sudden changes, although not contributing itself to the strength. Fireclay appears to be the best substance for resisting heat, and, if properly worked, is of considerable strength, as shown by tests made by the author. Nevertheless, these clays, which are vitrifiable, should be avoided, though stronger than others.

Greek Terra-cotta Statuettes, by C. A. Hutton (The Portfolio, No. 40), 1899. London : Seeley and Co., Ltd.

THE TRACTION ENGINE QUESTION

EXTRAORDINARY TRAFFIC AND EXCESSIVE WEIGHT.

Important Ruling.

At the Leicester County Court, on January 23rd, his Honour Judge Wightman Wood gave judgment in the case of the Leicestershire County Council v. William Atkins, brickmaker, Mountsorrel, heard at the December Court. The claim was for £200 for extraordinary expenses incurred between April 1st, 1898, and March 31st, 1899, by the plaintiffs in repairing the Leicester and Loughborough main road, passing through the parishes of Birstall, Wanlip, Rothley, and Mountsorrel, by reason of damage caused by excessive weight passing along the same and extraordinary traffic thereon.

His Honour, in giving judgment, said that this was a claim by the Leicestershire County Council against Mr. William Atkin for £200, the cost of repairing a highway, such cost being alleged to have been rendered necessary by the extraordinary traffic and excessive weight put upon the highway by the defendant during the year ending March last. The first question for determination which arose was whether this traffic was "extraordinary traffic" or "excessive weight" within the meaning of the Highways and Locomotive Act, which made persons liable to pay for damage done by extraordinary traffic and excessive weight. And when he spoke in this judgment of "damage" done, of course, he did not mean wrongful damage in the ordinary sense of the word, but merely wear and tear. Of course any vehicle passing over the highway, or even an individual, caused an infinitesimal amount of wear and tear, and extraordinary traffic only produced damage in the sense that it involved a greater and more rapid amount of wear and tear. But where the wear and tear was of a kind that was unusual on the particular road in question, then the Act of Parliament made the person who was responsible for that traffic liable for the cost of the repairs. The first point he had to determine was whether this particular traffic put on the highway by the defendant was extraordinary traffic or excessive weight within the meaning of the Act. Defendant was a brickmaker, and had been carrying on the business for some twelve years, and during that period he had been in the habit of bringing large quantities of bricks over a portion of the highway between Loughborough and Leicester. Until about two years ago he used to carry the bricks in ordinary carts drawn by a single horse, the load then being about two tons, including weight of cart. There was no evidence that he had increased his traffic in regard to aggregate quantity; he had from first to last carried about the same quantity of bricks in a given period, the tonnage being roughly, something like 5,400 tons per year. But he made an important change in the mode of conveyance, because, instead of continuing to use carts drawn by horses, about two years ago he started a traction engine. This engine weighed eleven tons, and by means of it he used to draw his bricks over the highway in big trucks, each of which when loaded with bricks weighed about ten tons. The usual plan was to send two trucks at a time with the engine, and sometimes three. It was alleged on the one side, and denied on the other, that this constituted excessive weight and extraordinary traffic within the meaning of the Act of Parliament. Assuming for a moment, for the purposes of this part of the judgment, that there was any additional wear and tear caused, he (the Judge) thought that it was within the meaning of the Act of Parliament both excessive weight and extraordinary traffic, having regard to the usual traffic passing on this road. He thought this had been practically decided by previous cases which had been heard in the High Court. In the case of Watlington v. Hoskins, 50 Law Journal, Magistrates Cases, page 19, it was held that in ascertaining whether an excessive weight had been carried along a road the Court had to consider, not the aggregate weight carried, but the conditions under which such weight was carried; if it was distributed in such loads as were usual on the road it was not excessive. He found as a fact in this case that no greater aggregate quantity was carried during this year than in previous years, but instead of being distributed as it used to be in the normal way by means of carts, the weight of which, including the loads, was not much more than two tons, the method of distribution had been changed, and a traction engine used which drew two or three truck-loads weighing some ten tons each. He thought the case he had quoted showed that this method of haulage amounted to carrying excessive weight within the meaning of the Act. He also thought that it was "extraordinary traffic." The case of the Borough of Wolverhampton v. the Salop County Council, 64, Law Journal, Magistrates' Cases, page 179, showed that the mode of user of the road might make traffic extraordinary, though the quantity was not increased, as when a string of carts was sent following one another in the same track. In that case it was held that the traffic was extraordinary, although exactly the same number of carts were sent before, but separately. The present case, looked at from that point of view, was even stronger, the mode of user being totally different to that which had previously been. But the case of Lord Aveland v. Lucas, 49, Law Journal, Common Pleas, 643, was, he thought, entirely on all fours with the present case, because there the appellant used a traction engine drawing two waggons for the carriage of materials used for ordinary purposes, and thereby caused more than ordinary wear and tear, and it was held in the Court of Appeal that this was "excessive weight" and "extraordinary traffic" within the meaning of the Act. There the materials carried were such materials as were ordinarily used in the district, and so they were here. It was not alleged that there was anything extraordinary in the carrying of bricks in this district. In the case quoted, too, there was apparently nothing unusual about the aggregate quantity carried, neither was there in this case. But the appellant in the case referred to took to using a traction engine which drew two heavy waggon-loads at a time, instead of distributing the carriage as before, and it was held on that ground to be "extraordinary traffic." Therefore, he had no doubt that this mode of carrying the traffic being unusual on this road, it was as a matter of law within the Act, if damage were established, both as being "extraordinary traffic" and "excessive weight." The next point raised by the learned counsel for the respondent was that no damage was done in fact, and he was asked to come to that conclusion by this line of reasoning. It was said that the wheel of the engine was so much wider than the wheel of the country cart—the former being 18 in. and the latter 4 in.—that the weight thrown on each square inch of ground in contact with the wheels was considerably less in the case of the engine than in that of the old carts. That was said to be conclusive of the whole matter. But it seemed to him there was a fallacy about that. No evidence was given to show that if it were the fact that the weight per square inch was less in the case of the engine, therefore necessarily less damage was done to the road by a wheel carrying a greater weight in the aggregate, though not greater in the proportion of weight to the square inch. He certainly could not assume that less damage was done. Even apart from the direct evidence of damage, and almost as a matter of common-sense, he thought that the greater weight, though distributed over a wider wheel, was much more likely to press out the road and break in the crust than the smaller weight carried on the narrower wheel. Of course, if the wheel had narrowed down to such a point as to become almost a knife-edge, it might be a different thing. He also thought that upon the evidence it was perfectly clear damage was done by reason of the mode in which these bricks were carried. Then it was said that if any damage was done it was because the road was not in proper repair at the time this engine first came upon it. No evidence whatever was given to him to prove that fact; he was merely asked to draw an inference that that must be so. No evidence was called before him to show that this road was not in a satisfactory state when the engine first came upon it, and he thought there could have been no great difficulty in producing such evidence if it had been the fact. The respondent only showed that less money had been spent on the average in the two years next before the engine commenced work as on the average of the previous four years; but as to that the County Council said that they were able to do the same amount of work more economically. He could not find, therefore, that the road was not properly kept up, nor that the damage was done because it had not been maintained in a proper state of repair. Therefore, he thought upon all these points that judgment must be given in favour of the plaintiffs. And now came the question—generally the most difficult question in these cases—as to the amount. That was a very debatable and a difficult question to decide with any satisfaction to one's self. The County Council, in regard to the amount, rested their case, if he might say so without disrespect, in the same kind of vague and loose way that the respondent had rested his case with regard to his points against them. They were content to say that during the two years before the engine came, they spent so much; that the year it first came on the road they spent so much more; they had a settlement with the respondent as to that year during which he only used the traction engine for nine months; and then for the year now in question they spent so much more again, and they simply claimed the difference. Now, what struck him as very peculiar in regard to this case was that the amount claimed for the year now in question was a great deal more than the amount of damage which was alleged to have been done in the preceding year, even after taking into consideration the fact that the engine was only used for nine months during the first year. That was a matter which had not been satisfactorily explained to him by the plaintiffs. The respondent did give what seemed to him a very reasonable explanation of it. He and his witness, the late surveyor of the road, said the explanation was that the County Council had made this road in the last year a very great deal better than ever it was made before, and in that he (the Judge) was with the respondent. The County Council gave no evidence that the engine was used more frequently per week in the year in question (1898-99) than in the year 1897-98, whilst the respondent, who was not contradicted, said that his user was exactly the same, and that he carried substantially the same amount of bricks. Therefore, excepting that it was used for a longer period, he saw no reason whatever, in the evidence, for coming to the conclusion that the road was being injured to any greater extent in the second year than in the first. The difference in the amount claimed, as between the first and second year, was enormous, although, as he said, no evidence was given of any greater user during the second period than the first. And, therefore, some explanation had to be found of this very largely increased expenditure. That explanation was sworn to on the side of the defendant as being that the road was now kept in a better condition than it was before. He (the Judge) accepted that; it was a satisfactory explanation to his mind. He thought there was nothing more probable than that in these days, when traction engines were being brought so much on the roads in many parts of the country, and their use becoming so much more frequent—there was nothing more likely or probable than that the County Council should have made this road a better road than it was before. Therefore, he thought it was proved that a great deal of this expenditure was not expenditure incurred in merely reinstating the road in the same condition as before, in consequence of the wear and tear caused by this engine, but in making the road better able to bear the weight of traction engines. The County Council were not under any legal obligation at present to make this road capable of carrying traction engines, though they might reasonably do so, and it seemed to him they were not able to charge it against the respondent as repairs done in consequence of the excessive weight and extraordinary traffic he was putting on the road. They were only doing what many other County Councils were doing in various parts of the country. From the evidence before him he could not come to the conclusion that the expenditure of this large sum of money was inevitable and unavoidable owing to the damage done by the respondent. If he had found that, as a fact, this whole expenditure was unavoidable, the respondent would have had to pay the whole of it. The road was made better and stronger than it was before, but it was not inevitable that that should be done, and, therefore, the respondent could not be called upon to pay the whole cost. He thought he could see his way very clearly to ascertaining what proportion of the money spent was owing to the damage done by respondent. The way he arrived at it was this: In the first year the County Council did no more than restore the damage done, and he knew what that sum was—he knew what it cost them, as against what it cost them in the three preceding years. He started with the expenditure of those three years as a basis; then he took the expenditure of the first year the traction engine came—when it was only used for nine months. It was assumed by the County Council that the difference between what they spent that year as against the average of what they spent before was the measure of the damage done by the respondent; and then he had to consider that he used the road three months longer in the second year than in the first. Taking this view, he was able to say pretty well what the damage done by the engine was, as against what was done to make the road better than it was before. He also took into consideration the fact that another engine was used, by other parties, over a portion of the road used by the respondent. In the result, after giving the case his most careful attention, his Honour had come to the conclusion that the respondent was liable for £105, and for that amount he found for the plaintiffs, with costs on the ordinary scale.

A CASE THAT MAY BE TRIED.

At a recent meeting of the Norman Cross District Council the question of excessive road traffic was raised. The surveyor called attention to the state of the highway from the Norman Cross Brickyard to Yaxley Station, which had been much cut up through the carting of bricks. It appeared that the bricks were hauled to the station by a traction engine on two trucks. The trucks when loaded weighed 13 tons each, and the engine 13 tons. During the recent wet weather the roads had been rendered almost impassable. The question for suing the company for expenses occasioned through extraordinary traffic was discussed, but in view of the difficulties of the situation it was decided to write to the County Council, and ask them to prohibit locomotive traffic on one portion of the highway in question.

APPLICATIONS FOR PATENTS.

24,074. E. Cowell. An Improved Air-brick.
24,281. O. Howl. Improvements relating to the Manufacture of Bricks.
24,552. A. L. Maynard and J. Watts. Improvements in Machinery for making Bricks.
24,612. J. C. Sellars. Improvements in Manufacture of Building Tiles, &c.
24,797. G. W. de Tunzelmann. Improvements in Fire-Bricks and Earthenware Articles exposed to high temperatures.

SPECIFICATIONS ACCEPTED.

2,938. (1899). J. Ward, Lancaster. Improvements in Kilns for Drying Stone, &c.
19,192. (1899). W. Allison and J. English, Birtley, Co. Durham. Improved Method for Drying Bricks.
19,287. (1899). J. P. B. Fiske, Massachusetts, U.S.A. Improvements in the Manufacture of Bricks, &c.
19,168. (1899). H. R. Vaughan, Belfast. Improvements in Continuous Kilns for Burning Bricks, &c.

THE WORKMEN'S COMPENSATION ACT, 1897.

WHAT IS A WHARF?

This question came up for solution in the recent appeal case of Haddock *v.* T. Humphrey. The plaintiff appealed from the refusal of the Liverpool County Court judge to award her compensation under the Workmen's Compensation Act for the loss of her husband, who was killed while in the employ of the defendants, carters, of Liverpool, at the timber yard of Messrs. Parker in Canada Dock. The points for consideration were: (1) Was the place where the accident occurred a wharf within the meaning of the Factory and Workshops Act, 1895? and (2) was the machinery—an overhead crane—which was used on the premises machinery within the meaning of that Act? Counsel explained that the yard of Messrs. Parker was about 150 yards from the waterline at Canada Dock. Behind the quay was a roadway, and behind the roadway were situate the offices of the timber merchants who had timber yards immediately in the rear. The county court judge held that the words "quay" and "wharf" were absolutely identical, and that the wharf ended at the beginning of the roadway in front of the offices and timber yards. He, therefore, decided that the yard of Messrs. Parker, where the accident happened, was not a wharf within the meaning of the Workshops Act. and that the plaintiff could not recover compensation for the death of the deceased under the Compensation Act. The plaintiff contended that any place in a dock which was not covered over, and where goods where stored, was a wharf, and that, therefore, the yard of Messrs. Parker was part of the wharf in Canada Dock. Lord Justice Smith, in giving judgment, said the conclusion he had arrived at was that the place where the accident occurred was a timber yard and not a wharf. In his view the word "wharf" meant a place which had something to do with water; it did not include a yard which was cut off from the piece of land, which, in his opinion, was the wharf at Canada Dock. The appeal was, therefore, dismissed with costs.

"WHAT IS SCAFFOLDING."

In the case of Maud *v.* Brook, heard recently in the Court of Appeal, claim was made by a widow in respect of the loss of her husband, who, when the accident occurred, was at work on two villas which were being built by the defendant at Victoria Park, Leeds. Judge Greenhow had awarded the applicant £296. The master appealed, and two questions were raised for decision—namely, what was the meaning of the words, "a building being constructed," and "scaffolding," as used in section 7 of the Act. That section enacted that the statute should apply only to employments by the undertaker as thereinafter defined, and one of these employments was "on, in or about any building which exceeds 30ft. in height, and is either being constructed or repaired by means of a scaffolding." Mr. Ruegg (for the master) said there was no question as to the houses being more than 30ft. high. The deceased man was a plasterer and he was working on the top floor of one of the villas finishing off the wall of the landing with a "float." The houses had been roofed, and the scaffolding was still up outside, although the outside work was practically finished. The banisters had not been put up, and the evidence showed that the plasterers used boards, supported by trestles, to reach the ceilings and the upper portions of the walls. Maud's mate saw him last "floating" the wall of the landing on the top floor, and he was then not standing on any ladder or other erection. Soon after that the sound of a fall was heard, and, hurrying up, his fellow-workmen found that Maud had, in some way, overbalanced himself or stepped backwards over the landing, and fallen down on the floor below. He was conveyed to the hospital, where he died of concussion of the brain. The County Court Judge found that the accident happened to Maud whilst engaged on a building more than 30ft. high, which was being constructed by means of scaffolding. Appellant said that finding was wrong, first, because plastering a house was not a work of "construction"; and, secondly, Maud was not at work—could not have been at work—on scaffolding 30ft. high when he met with the accident, which had nothing whatever to do with the scaffolding at all.—Lord Justice A. L. Smith: "The section of the Act does not say the scaffolding must be 30ft. high."—Mr. Ruegg: "That is true; but the scaffolding must be of the kind that is popularly known by that name—upright poles, with spars or boards lashed to them, upon which other boards are placed, to enable men to work at a height above the ground. I say that boards placed on two trestles, or on two chairs or boxes, is not such a kind of scaffolding as the Act here refers to."—Lord Justice A. L. Smith: "What is a scaffold must be a question of fact in each case. We held that a painter who was repainting an old house by means of a ladder and a board reaching from a rung of the ladder to the window was not at work on a scaffold."—Lord Justice Collins: "If a board on two trestles or on two chairs is a scaffold, where would you draw the line? Suppose a workman was repairing a ceiling on such a scaffold, and another workman tumbled up or tumbled down the stairs, and broke his leg, would the master be liable? He met with the accident while at work in, on, or about a building being erected or repaired by means of a scaffold."—Mr. Ruegg replied, if the word was not limited to a high scaffold of the kind commonly known by that term, the decisions of the Court must be carried *ad absurdum*. He submitted that the word scaffold in the Act did not cover the boards and trestles used by plasterers when finishing out an ordinary room. The defence pleaded was that the employment of Maud at the time of the accident was not an employment to which the Act applied, and he pressed the Lords Justices to allow the appeal.—Mr. Crompton, for the workman, contended that the decision of the learned County Court judge was right. There was nothing in the Act defining or limiting the kind of scaffold by means of which the building was being erected, and, therefore, a board on trestles was a scaffold. A house was still in course of erection till the walls were plastered and the banisters put up.—By a majority, the appeal was dismissed, with costs, Lord Justice Collins dissenting.

THE LAW.

Brickworks Erections and the Local Authorities.—At the West Riding Police Court, Sheffield, on January 30th, before Alderman Gainsford and Sir Alexander Wilson, William and George Mottram, brick manufacturers and builders, of Wadsley Bridge, were summoned by the Wortley Rural District Council for committing an alleged offence under the bye-laws. Mr. C. Hodgkinson, of Penistone, prosecuted, and Mr. T. E. Ellison (instructed by Messrs. Rodgers, Thomas, and Sandford) appeared for the defence. Mr. Hodgkinson said the defendants were summoned under the 17th bye-law of the sanitary authority, and were charged with having erected buildings without giving notice to the Council and submitting plans. The building in question was located in the defendants' brickyard, near Wadsley Bridge, and was 26ft. 3in. long by 13ft. 9in. broad. Mr. George E. Beaumont, sanitary inspector, bore out the facts as stated. In cross-examination, he said he did not suggest the place was going to be used for a dwelling house. About five years ago Messrs. Mottram erected a similar place, but witness could not remember saying plans would not be required. The summons was the first intimation given the defendants; he believed the building complied with all other bye-laws. Mr. Ellison submitted that the case had not been made out, and the bye-law did not apply to the building in question, and even if it did, the bye-law would be invalid, for if the building did not infringe any other bye-law, no offence would have been committed. The Chairman: That means no one need send in plans? Mr. Ellison: Yes—at his own risk. Continuing, Mr. Ellison said such a contention might seem a startling one, but one must consider the case of a man who happens to have made a mistake, and has not complied with the bye-laws, the authorities would say he must take down the building, or they would take it down for him. A builder would not run that risk to get out of sending in plans. It was certain that the bye-law was only meant to apply to dwelling houses. Mr. Ellison then read the judgment of the Divisional Court in Fielding *v.* the Rhyl Improvement Commissioners, 1896. In the decision it was declared that to take a brick-kiln as coming within the meaning of such a bye-law would be perfectly ridiculous, and regarding a temporary shed, it was held "absurd to hold this was a building within the meaning of the bye-law." Mr. Hodgkinson said it would have to be proved that the building was merely a temporary one. Mr. George William Mottram said when his firm erected a similar building five or six years ago they were told by Mr. Beaumont that no plans would be required. The place was 25 or 30 feet below the road, and the land would be filled up shortly in order to build thereon. The Chairman said the Bench were of opinion that the place was not a building within the meaning of the bye-law, and the case would be dismissed. An application for costs was refused.

The Necessity for Stamped Documents.—James Geary sued the Bellingdon Brick Company for balance of money due on account of work done.—Mr. Scarlett was for the plaintiff, and Mr. Fourmy for the company.—Mr. Scarlett said that an agreement was made between the plaintiff and the company for the digging of a well, for which plaintiff was to be paid £90, out of which certain sums were to be paid as the work went on. The well was made by his client, and water came freely from it. There was a balance due of £21 7s., and there was another claim for £5 as work done outside of the contract.—Mr. Scarlett handed in the agreement entered into between the two parties.—Mr. Fourmy objected to this as the document was unstamped.—Mr. Scarlett argued that this was not necessary, as it was provided that it was unnecessary to have stamped documents when they related to work of the present character, where plaintiff was paid money in return for his services as the work proceeded.—His Honour looked at the agreement, and said he could not uphold Mr. Scarlett's contention in the present instance.—Mr. Scarlett then asked that the case might stand adjourned in order that the agreement could be sent to Somerset House and stamped.—His Honor concurred and the case was adjourned.

A Welsh Bankruptcy Case.—This was the case of Mr. R. H. Roberts, Willow Dene, Llandrillo yn Rhos, who traded in co-partnership with Thomas Starkey, Trillo Villa, Llandrillo yn Rhos, under the style of the Rhos-on-Sea Brick and Tile Company, Penrhynside, near Llandudno. The gross liabilities were returned at £1,717 16s. 9d., of which £1,589 was expected to rank. The assets were £559, and there was a deficiency of £1,160 8s. The bankrupt alleged his cause of failure to the want of capital. In his observations on the case the official receiver said there had been a most unaccountable delay in filling the accounts, which was probably due to Starkey absconding, and to the fact that the other bankrupt was not fully acquainted with the business. The brickworks were originally started by Starkey in partnership with Mr. Evans, of Colwyn Bay, builder. In 1898 Evans retired, and the bankrupt Roberts entered the firm. At that time there was an overdraft of £1,054 at the Colwyn Bay branch of the North and South Wales Bank, which was guaranteed by Mr. Horton. When the new firm commenced business Roberts put securities in the bank worth £1,000. The overdraft was transferred to them, and Mr. Horton's guarantee continued. Roberts stated that he thought the deeds were by way of deposit to draw money against, and not to pay the old overdraft. But the Bank would not allow him to draw money, and to that he attributed his failure. The largest creditor was Mr. Horton, who was scheduled for £295 17s. 6d., but the official receiver understood he claimed a much larger sum. At the time of the receiving order Mr. Horton was in possession of the brickworks under a distress for rent. The bankrupt's separate estate showed that he had assets estimated to produce £1,023 12s., and the gross liabilities were £73 10s., of which £47 5s. 10d. were expected to rank, leaving a surplus on the personal estate of £976 6s. 2d. No statement of affairs had been filled by Starkey, and his furniture realised £61. In answer to the official receiver, bankrupt said he knew nothing about the silver which was pawned by his wife. It was not sold by his instructions. The examination was adjourned.

Alleged Brick-burning Nuisance—Medical Officer cannot discover it.—The Town Clerk of the Croydon Council, at a recent meeting, reported the receipt of a letter from a gentleman in respect of an alleged nuisance caused by brickfields. The matter had already been considered by the Sanitary Committee, and the Medical Officer had reported that in his opinion no nuisance existed which was injurious to health. —Alderman Foss moved to refer the matter again to the Sanitary Committee.—Councillor Addison remarked that the committee went very fully into it, and the Medical Officer did not consider it injurious to health. The gentleman had his remedy against the owner of the brickfields if he believed there was a nuisance.—Councillor Wickham Jones had no doubt that the fields were a terrible nuisance, and that there was a great deal in the complaint.—Alderman Goodwin said the difficulty was that their Medical Officer was averse to the opinion of the writer of the letter. At the same time he (Alderman Goodwin) agreed that the brickfields were a serious nuisance, and that in summer-time it was intolerable.—Councillor Shirley saw no use in referring the matter back, as they had already considered it twice.—The motion was lost, and the Council then went into committee.

NEW COMPANIES.

The North British Granite and Whinstone Quarries, Limited.—45, Renfield Street, Glasgow, to carry on the business of quarry-masters and brickmakers, merchants, &c. Capital £20,000 in £1 shares.

The Eglinton Limestone Company, Limited.—To carry on the business of manufacturers, merchants, miners, quarrymasters, brick manufacturers, &c., at Glenarm, in the county of Antrim, Ireland, and in Glasgow. Capital £12,000 in £1 shares. Registered office, 212, West George Street, Glasgow.

Castle Donington Brick Company, Limited.—Capital £2,500 in £10 shares. The first directors (to number not less than three nor more than seven) are W. S. Eaton, G. T. Eaton, J. G. Shields, T. Webb, G. Welch and F. E. Burton. Qualification, £150, Remuneration as fixed by the company. Registered office: Castle Donington, near Derby.

Borough Green Brickfields, Limited.—Capital £2,500 in £1 shares. To acquire the business carried on at Borough Green, Kent, by H. J. Lee, and to carry on the business of brick, tile and pipe manufacturers, &c. The first directors (to number not less than two nor more than five) are H. P. Monckton (chairman) and H. J. Lee (managing director). Remuneration as fixed by the company. Registered office: 32, Walbrook, E.C.

Walker and Crawshaw, Limited.—Capital £35,000 in £1 shares. To acquire the business carried on by Walker and Crawshaw at Conisbrough, York, and to carry on the business of brick, tile pottery and earthenware manufacturers. The first directors (to number not less than four nor more than five) are G. Walker (chairman), G. Crawshaw, L. T. Crawshaw and R. Crawshaw. Qualification, £500. Registered office: The Works, Conisbrough, near Rotherham.

Canvey Brick Company, Limited.—Capital £50,000 in £1 shares. To construct and maintain public works of every description; as colliery owners, manufacturers of and dealers in bricks, lime, cement and building materials of every description. The first directors (of whom there shall be not less than two nor more than five) are the first three signatories to the memorandum of association. Qualification, £250. Remuneration to be fixed by the company.

Stone & Co., Limited.—This company was registered on January 6th by P. le Brun, 30, Plough Road, Rotherhithe, with a capital of £37,000 in £20 shares, to acquire the business now carried on as Stone and Co., Limited (incorporated in 1884), and to carry on the business of brickmakers, merchants, and manufacturers of building materials, &c.

Avon Aberthaw Lime and Portland Cement Company, Limited.—Capital £1,000 in £1 shares. To carry on the business of Portland and other cement manufacturers, lime and plaster manufacturers and merchants, etc. The number of directors is not to be less than two nor more than five. The first are Thomas Hambly and Thomas Williams. Qualification, £100.

Corrall & Company, Limited.—Capital £75,000 in £5 shares. To acquire the plant, fixtures and other property of the businesses of coal merchants, and brick, tile and pipe manufacturers, etc. The number of directors is not to be less than three nor more than seven. Two of the first are to be appointed by the "A" shareholders, and three by the "B" shareholders. Qualifications, 2 0 shares. Remuneration. as fixed by the company.

Lumley Brick Company, Limited.—Capital £20,000 in £50 shares. To acquire under an agreement made Jan. 13th by this company with T. Gilchrist, the business of the Lumley Brick Company, Lumley, Durham, and to carry on the general business of brick, tile, terra cotta and earthenware manufacturers, quarry-masters, &c. The directors are R. Herron, G. A. Atkinson, W. R. Waddingham, J. Lunn and W. Dodd. Qualification, £500. Remuneration to be fixed by the company.

Thomas Wragg and Sons.—Capital £150,000, in £5 shares, to acquire and take over as a going concern the business carried on at Swandlincote, in the county of Derby, under the style of Thomas Wragg & Sons, and to carry on the business of manufacturers of and dealers in firebricks, fireclay, glazed, blue, and building bricks, etc. The number of directors is to be three. The first are: John D. Wragg, Robert B. Wragg, and Horace Wragg; qualification, £1,000; remuneration, £50 each per annum.

Quarry Waste Development Company, Limited.—Capital £1,000 in £1 shares. To acquire from G. M. Callender and carry on the business of a consulting brickworks' engineer carried on by him, and to acquire the benefit of an agreement of the 6th January, 1899, with Albert William Fludden, and also to carry on business as brick, tile, and terra-cotta makers, and in particular the manufacture of bricks and articles of a like nature from quarry waste. The first directors (to number not less than two nor more than five) are to be appointed by the subscribers. Qualification, twenty shares. Registered office: 11, Victoria Street, S.W.

Model Brick and Terra-Cotta Works, Limited.—Capital £10,000 in £1 shares, for the purpose of taking over from the liquidator of the Model Brick and Terra-Cotta Works, Limited, incorporated in 1898, the premises comprised in and granted by an indenture of fee form grant, dated August 3rd, 1897, and the fixed and movable plant and machinery erected thereon, and to carry on in all of their branches the trades or businesses of brick, tile and terra-cotta manufacturers. The first directors are Messrs. R. J. McConnell, J.P., James Graham, M.D., Hugh Strain and R. Gibson. Registered office: Balmoral, Belfast.

Rotherham Estates Company, Limited.—Capital £5,000 in £1 shares. To acquire a freehold building estate at Rotherham, Yorkshire, to adopt an agreement made between M. R. Roberts of the one part and E. T. Corbett of the other part, to purchase, sell, lease and deal with real and personal property of any description, and to carry on the business of builders, brick makers, coal and iron masters, stone merchants, &c. The first directors (to number not less than three nor more than five) are E. Hutchinson, G. Williams, M. R. Davies, G. Gummer and J. B. Jenkinson. Qualification, 30 shares. Remuneration as fixed by the company.

TRADE NOTES.

The Scottish Silicate Brick Company, Limited.—Mr. John M'Cartney Cairncross, mining engineer, Coatbridge, and Mr. Alexander Pettigrew, stationer, Coatbridge, have joined the board of directors of the above company.

The Cranham Brick and Tile Company have acquired about twenty acres of land known as "The Moors." The clay has proved well adapted for brickmaking, and the land is immediately adjacent to the London, Tilbury and Southend Railway.

A Huge Cement Combine.—It is stated that a very important combination of cement manufacturers is in process of arrangement, and a company is being formed in connection with it. The capital is to be £9,000,000, of which a large part will be offered for public subscription.

Messrs. J. Mensaque and Brothers, encaustic and glazed tile manufacturers, who have works at Seville, Spain, inform us that they have opened an office and show-room at 14, St. Mary Axe, E.C., where their Moorish titles—exact copies of those in the Alhambra at Grenada, the Alcazar at Seville, and the Mosque at Corboda—may be inspected.

Startling!—According to the *Globe* the real origin of the word "brick" is the proud reply of a king to an invading enemy who mocked at his unwalled towns: "My troops are my walls," he answered, "and every soldier is a brick." As a term of endearment it is said to have its origin in the "wall red" undergraduate.

Funeral of a Leicester Brickmaker.—On January 17th, Mr. Joseph Massey, of the Red Bank Brick Works, Measham, was interred in the Baptist burial ground at Barton Fabis; a number of the Red Bank employés were present. Numerous beautiful wreaths were placed upon the coffin. Mr. Massey, who was 53 years of age, had been an invalid for a long time past, and died at his residence at Ashby-de-la-Zouch on the previous Saturday.

Fletton and the War.—The Volunteer movement is being taken up enthusiastically in Huntingdonshire which has hitherto had no battalion. Lord Sandwich, who has offered £1,000 towards the equipment of 1,000 men, at a meeting at Fletton on Saturday night week for the enrolment of members, said he already had the names of 936 men. Mr. J. C. Hill, of the London Brick Company, who presided, offered to build a drill hall and to lend a day pit for rifle-shooting.

Death of a Kent Brickmaker.—We regret to announce the sudden death of Mr. Charles Wood, which occurred last month, at the age of 68 years, at Milton, by Sittingbourne. Mr. Wood was a well-known public man and was highly respected. He had been a member of the Urban Sanitary Authority and the Milton School Board for many years, and he was a brick manufacturer, coal merchant, and barge-owner, all of which undertakings he successfully conducted.

Advance in the price of China Clay.—Producers' Association formed.—A largely attended meeting of china clay producers was held at St. Austell, on January 26th, to consider the question of raising the price of clay.—The chairman (Mr. T. Martin, of Plympton) said some time ago they unanimously agreed to raise the price of all pottery clays two shillings a ton, but they now proposed to deal with all classes of clay. Coal and all materials connected with their production had so risen in price that they were entitled to a substantial advance.—Mr. T. Stocker considered that an advance of two shillings all round would not cover the extra cost of production in works which were worked by engines. (Hear, hear.)—Mr. F. Parkyn thought that any producer who agreed to the advance and then sold beneath the price should be mulcted in a penalty of £50 or £100, to be paid to the War Fund or some charity.—Mr. W. T. Lovering pointed out that

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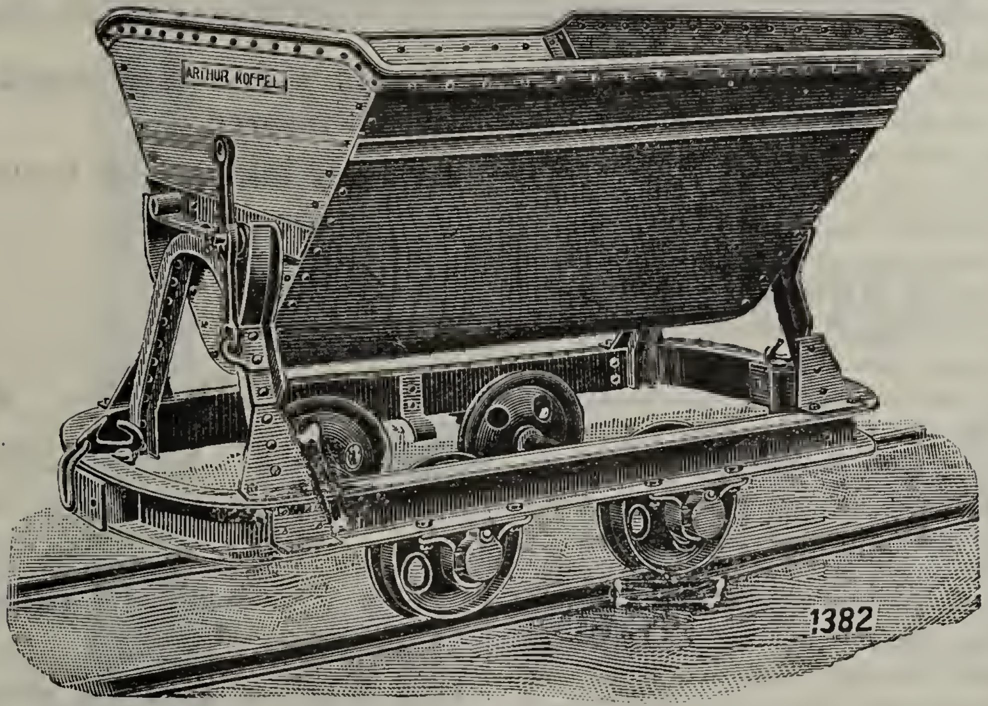

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"DOUBLE END" AND "ALL ROUND" TIP WAGONS ALSO STOCKED.

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STEEL TIPPING SKIPS

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Of Improved Type, made of Steel throughout.

SIZES KEPT IN STOCK:—¼, ½, ¾ & 1 CUBIC YARD.

many producers were not represented at that meeting, and asked what guarantee there was that these would agree to any advance of price agreed upon.—Mr. Hoyle observed that consumers were prepared to give a higher price, and in some industries concerned they were coining money just now.—The Chairman thought that fully four-fifths of the producers were represented at that meeting. —On the proposal of Mr. W. K. Baker, seconded by Mr. W. Peters, it was unanimously agreed to raise the price of all clays two shillings per ton on future sales.—A committee consisting of the chairman, Messrs. J. Lovering, T. Stocker, J. W. Higman, and W. Peters, was appointed to see producers unrepresented and endeavour to secure unanimous agreement to the advance.—It was resolved to form a China Clay Producers' Association to watch the interests of the trade, and it was left to the above committee to put the scheme into shape for a future meeting.

The Chinese Envoy in the Potteries.—By invitation of the North Staffordshire Chamber of Commerce, Sir Chihchen Lofengluh, the Chinese Minister, has extended his tour of important industrial centres in the country to the Staffordshire Potteries. His Excellency and his suite arrived at Stoke from London on Sunday, January 28th, and were at once escorted to the North Stafford Hotel. They were met at the hotel on the following morning by the members of the Reception Committee, Messrs. E. V. Greatbatch (president of the Chamber of Commerce), H. Boddington, and W. Boulton (vice-presidents), and A. P. Llewellyn (secretary). Mintons Limited were first visited. The party were met by Mr. George Leason (managing director) and Mr. L. H. Jahn (art director), and the Envoy was much interested when M. Solon—who is the admitted master of the *pâte sur pâte* process of decoration—drew his attention to the fact that this was invented in China. The idea was taken from a Chinese vase which was now in the factory at Sevres. The Minister showed his knowledge of English Art and artists by comparing M. Solon to Flaxman, a comparison which has been made many times during the last few years. In addition to the show rooms many of the working departments were here also visited. The show rooms of Messrs. Copeland's manufactory next received attention, the Envoy and his staff being there received by Mr. R. P. Copeland and his son, Mr. W. F. M. Copeland. At Cauldon Place Works, Hanley, which came next in order, they were met by Mr. F. T. Moore and Mr. John Leyland; and at Messrs. Johnson Brothers' sanitary ware works, Hanley, they were received by Messrs. Henry Johnson, Alfred Johnson, Fred Johnson, and George Meakin. Luncheon was served before a tour of the works was made, and the party were also introduced to the Mayor of Hanley (Mr. George Ellis). The show rooms and studios of Messrs. Doulton & Co., Limited, and the collection of Wedgwood ware at the Wedgwood Institute, Burslem, were inspected during the afternoon. Mr. J. C. Bailey (general manager), Mr. Alan Doulton, and Mr. John Stater (art directors) being present to give a welcome and supply information at the Nile Street Works. His Excellency, on returning to the North Stafford Hotel, was presented with an address of welcome from the Mayor and Corporation of Stoke. Later in the evening the Minister and suite were entertained to dinner at the hotel by the North Staffordshire Chamber of Commerce. The President of the chamber presided. In proposing the toast of the guest of the evening, he said they had with them that evening a distinguished scholar, an eminent linguist, one of the wisest men even his country had produced for half a century, a man of skill and learning in many directions, and a leader of thought in his own country. His Excellency, in acknowledging the toast, thanked the Chamber for the unrestricted opportunities which had been given him to inspect and to study an industry in which China and the Staffordshire Potteries had much in common. He hoped his visit to the district would assist to stimulate commercial relations between the two nations—(hear, hear).

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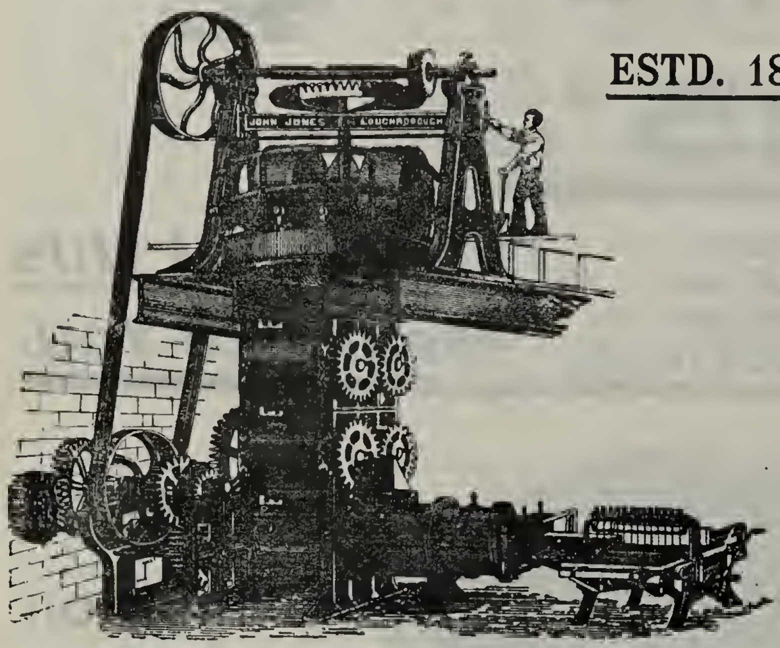

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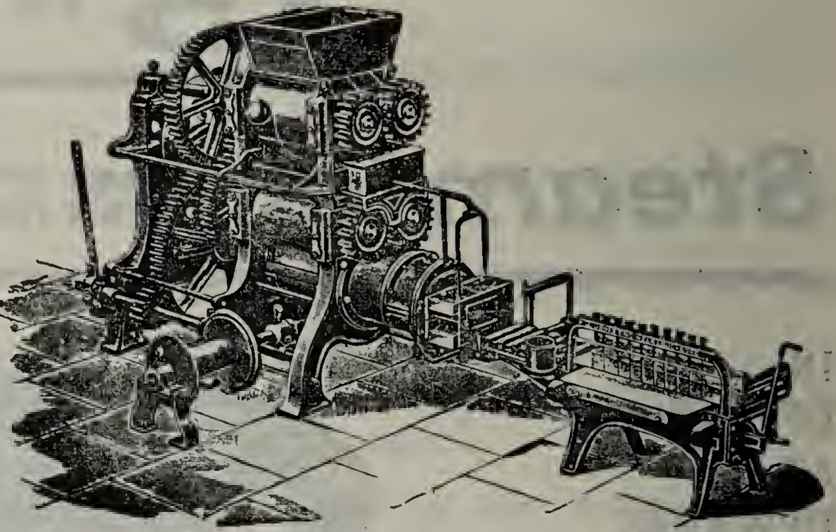

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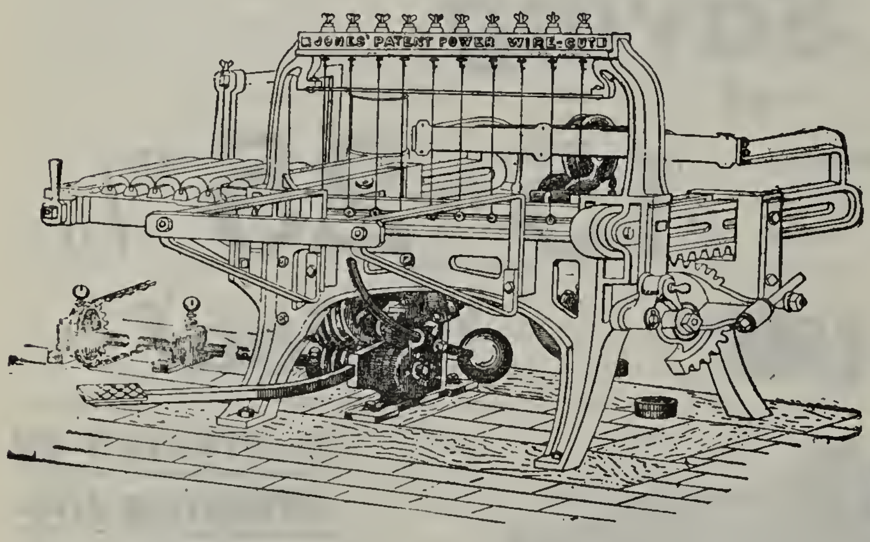

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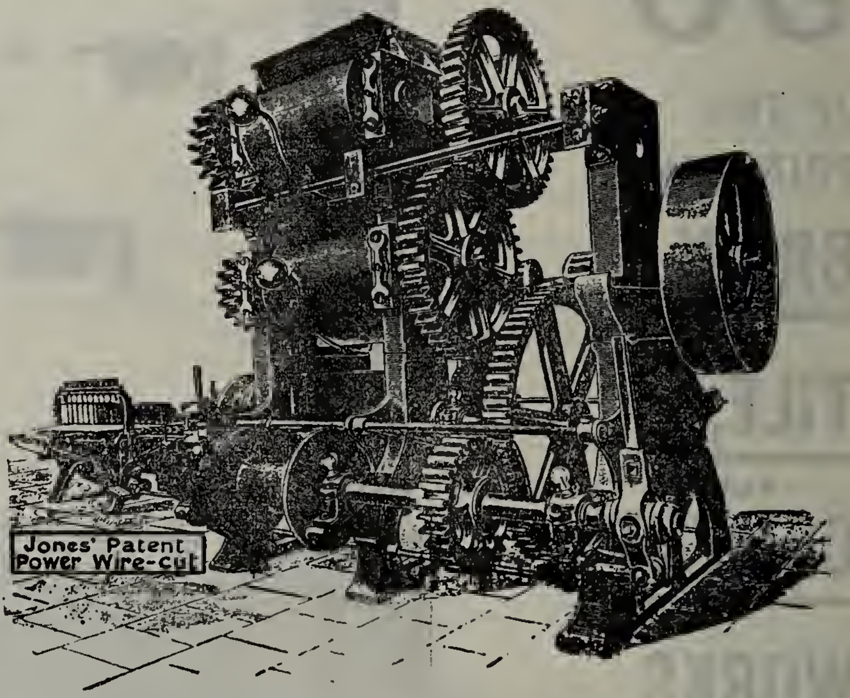

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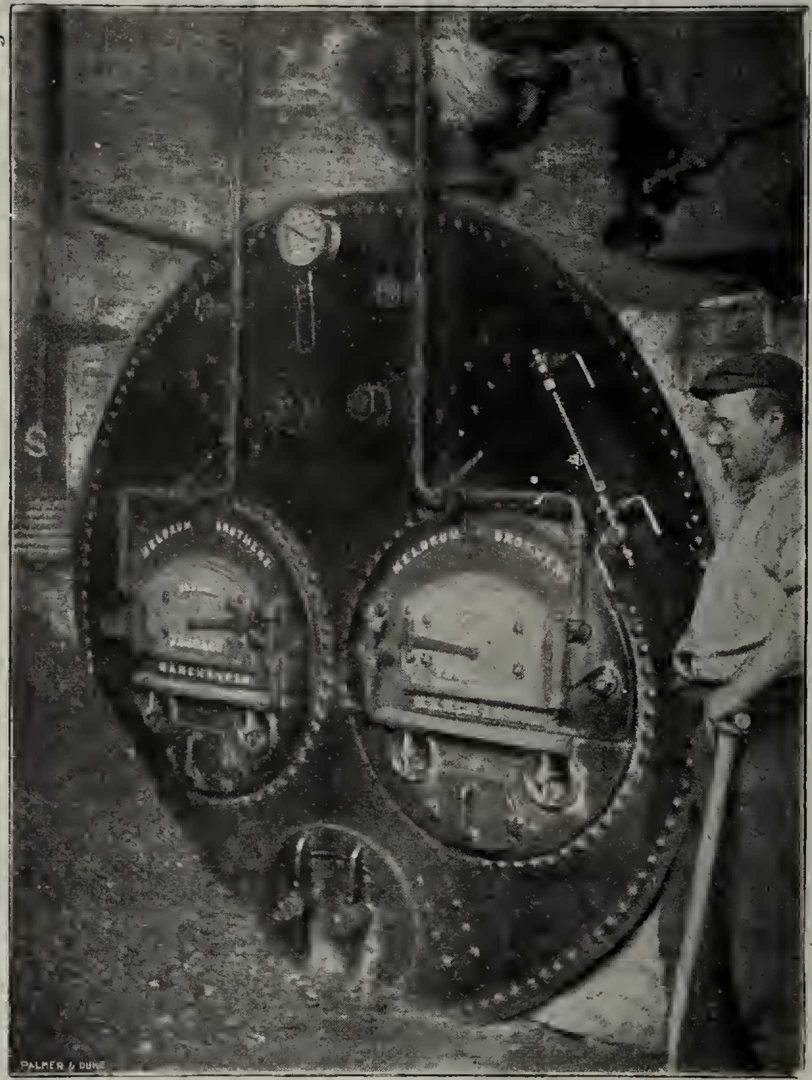

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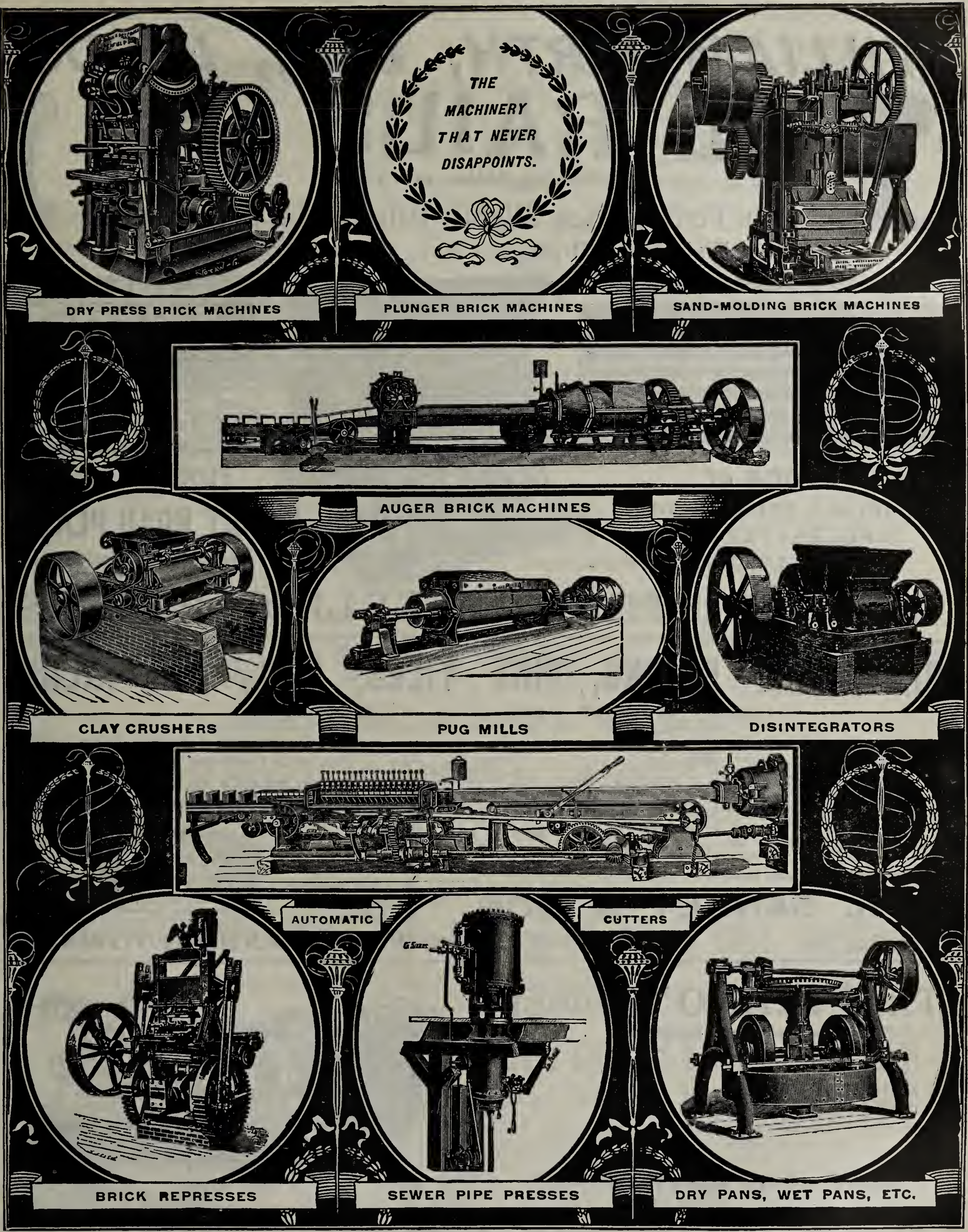

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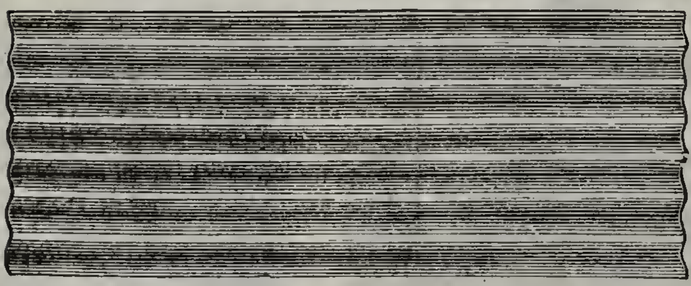

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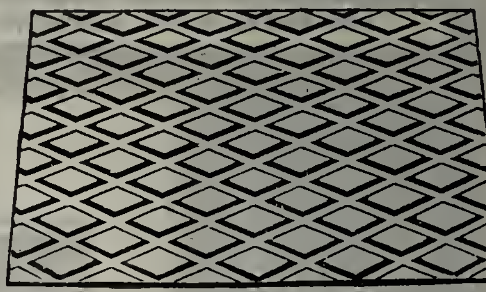

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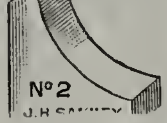

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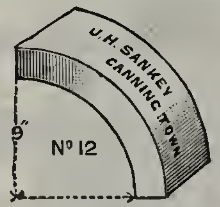

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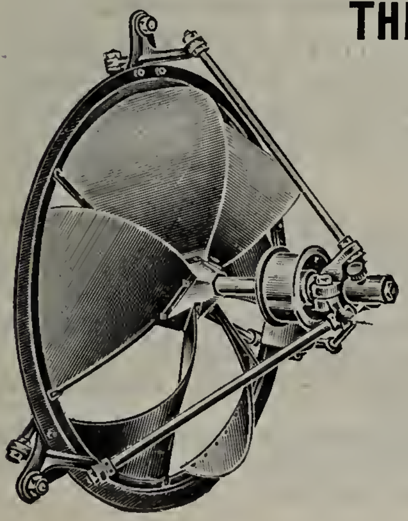

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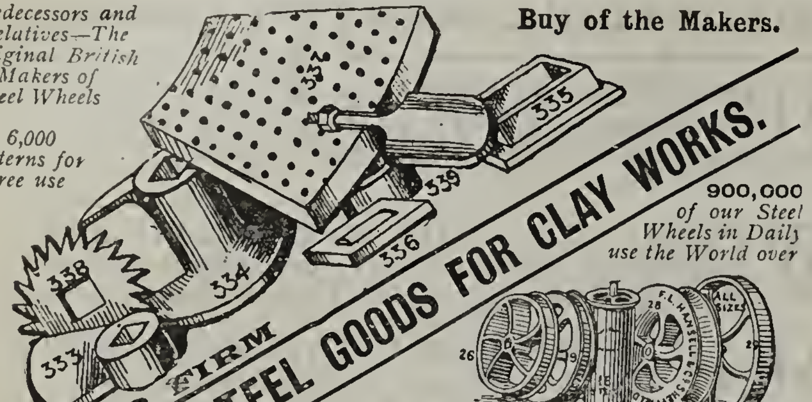

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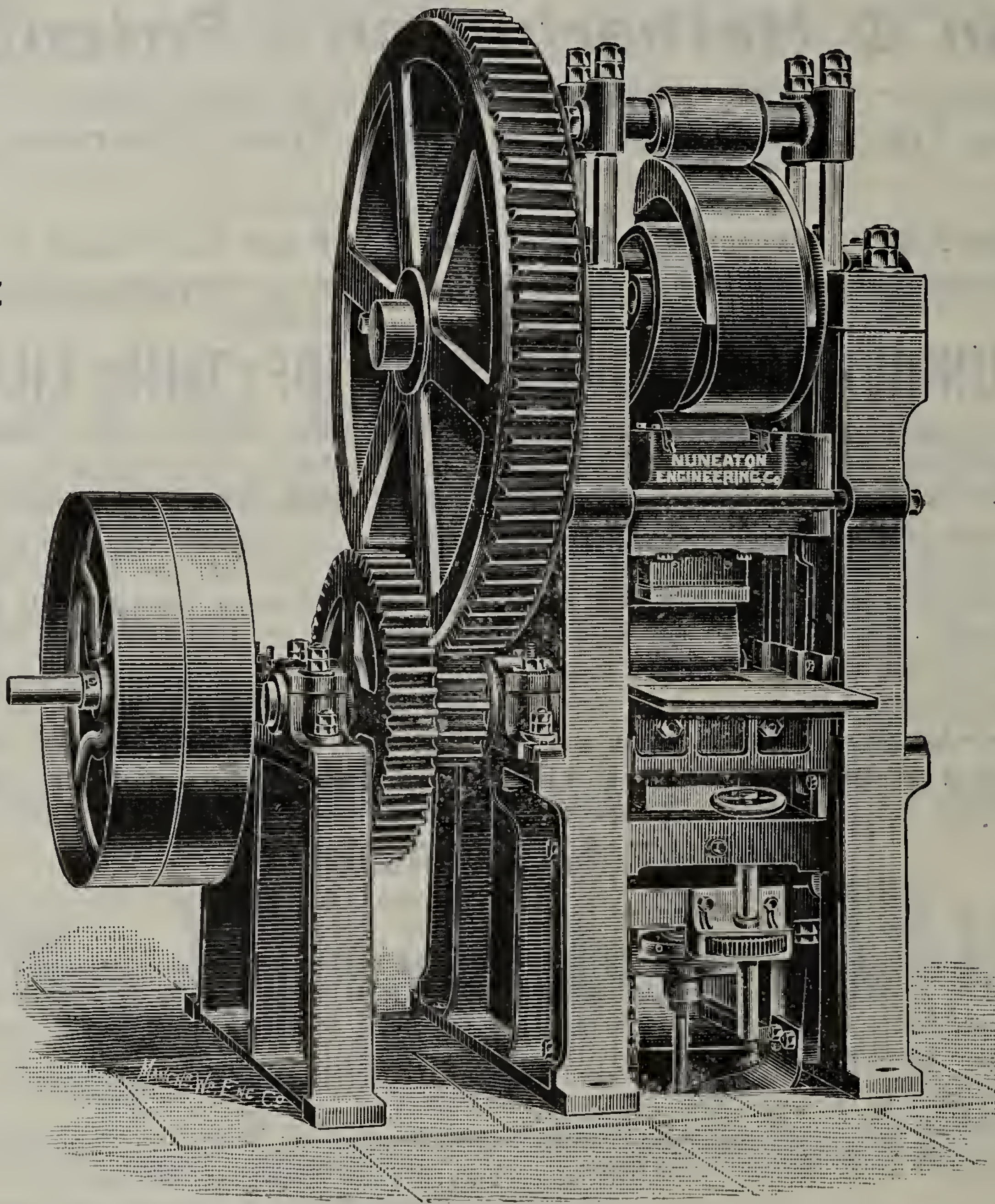
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THE BRITISH CLAYWORKER.

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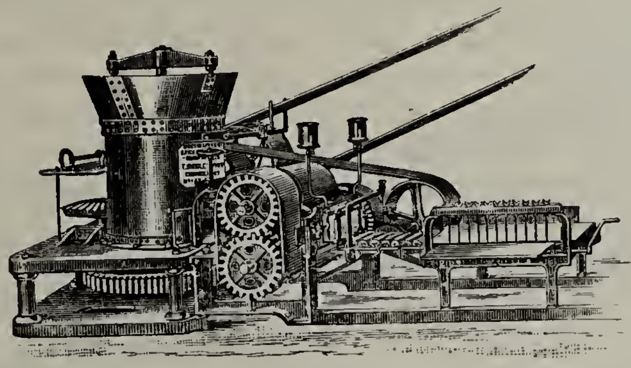

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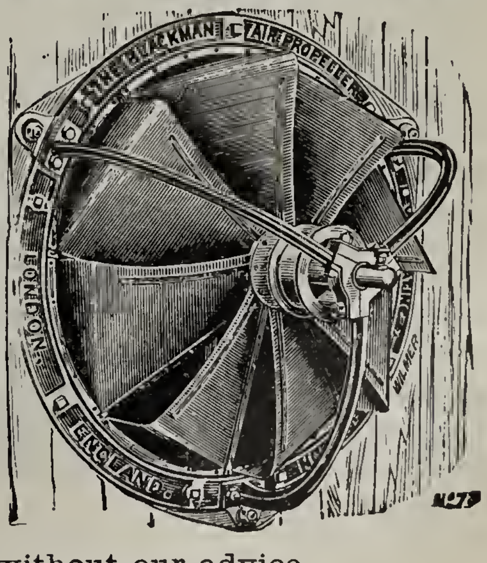

N.B.—We are not responsible for results when our Plant is used without our advice.

BY THE WAY.

We would call our readers' especial attention to the particulars we give on another page respecting the proposed gift by the building trades to the nation. This is a memorial that it should be the privilege of every brickmaker to help to raise, and we confidently look to the trade to do its share in bringing the scheme to a successful issue.

* * *

Although we have had a great deal to say, from time to time, concerning the Workmen's Compensation Act, we fear that many of our readers are still in ignorance as to its elementary provisions. They share with the workman the common belief that every form of injury has to be compensated, overlooking the fact that the Workmen's Compensation Act defines certain definite occupations, in one of which the workman must at the time of the accident have been engaged. For instance, in our own trade the accident must happen, among other places, "on, in, or about a factory," so that a man carting bricks from a yard on to the job or to a station would not come under the Act at all. Further, a building must be over 30 feet in height, and be constructed by means of scaffolding to ensure any workmen engaged upon it coming under the provisions of the Act. The Appeal Courts have given many interesting decisions in interpreting the Act, but none of greater importance than one recently delivered. It was decided that a man must have been engaged on his work for at least a fortnight before any claim for compensation could lie. In this case it arose out of the attempt to assess the average weekly earnings of a man who had been at work only one day.

* * *

Another important judgment more particularly affecting our readers engaged in the building trades, is that if a building owner engages a builder to do work for him, and this man enters into sub-contract with, say a painter, for the painting part only, the workmen must sue the builder. When, however, the building owner himself makes a contract, the painter in this case is the "undertaker" and can be sued.

* * *

We give a report of a case in our legal columns in which the Crowborough Brick Co. were summoned for neglecting to fence certain machinery in their yard. We should be the last to advocate the non-fencing of machinery, and we are aware that ignorance of the law is no excuse, but we certainly think that this company has been harshly dealt with. It appears that for eight years past the factory has been worked without complaint, and without any objections being raised by the Inspector of Factories. But a recent accident (we presume) at the works revealed certain defects and a prosecution is at once instituted. We have the greatest respect for Dr. Le Neve Foster, the Factory Inspector in this case, and we could wish that all Inspectors were as clever and as liberal-minded. But we think that he or his assistants are more to blame for the recent accident than are the owners of the brickworks, and that had their vigilance at sundry times of inspection been equalled by their present alacrity to obtain a conviction, the accident might have been obviated.

With so many imposts as are now placed upon the employer of labour, we think it is time that the method of visiting factories and quarries were revised by Parliament. At present the system is very lax, and a man never knows, and is never told, whether he is contravening laws or not, until he finds himself at Petty Sessions. As at Crowborough, he may get immunity for 10 years, but is pounced upon immediately the laxity of the Inspector is made palpable. Some of our Inspectors are always spoiling for a conviction, and we have known a brickyard proprietor make a suggestion to an Inspector for the better fencing of certain machinery and then receive a summons as the reward of making the suggestion.

* * *

The leaning tower of Pisa is all very well in its way, because it was undoubtedly intended by its architect that it should remain permanently out of the perpendicular, when it was first built—at least that is what we are told by those who ought to know. But we know of a leaning "tower" much nearer than Pisa. It is situated in a brickyard, and having been erected on sloping ground on London Clay as a basis, it is following the example set by its Italian ancestor. We were looking at this modern imitator the other day, and if something is not soon done to it, it will surely come to grief as well as the machine-house, kiln and drying sheds, with which it is intimately associated. If people must build high chimney shafts in such precarious situations they ought, at least, to understand that a good deal of money must first be spent in making the foundations secure, and in draining the site.

* * *

Although the lecture by Dr. Vivian Poore, given at Carpenters' Hall on the 8th February last, contained but very little original material, it brought home the fact that people take practically no care as to the selection of the soil on which the house they are to inhabit is built. A great deal has been written from time to time on the subject, but it is doubtful whether many have ever given it serious consideration. The writer has been frequently consulted in recent years as to whether clay soil or gravel is the better for the house to be built upon. The answer he has invariably given does not altogether agree with Dr. Poore's views, though it goes a long way in that direction. Dr. Poore lays special stress on the liability of "gases from the earth" to penetrate gravel and so to get into the house. In a limited way, that is no doubt correct, but, we cannot altogether agree with him that on the whole clay is a favourable soil for the average healthy individual. Has Dr. Poore ever stood on the top of a hill at sunrise or sunset and looked over a plain of clay, and noted the mist rising from it? If he has, then he must be well aware that such situations are particularly damp, and could hardly be regarded as ideal spots for building houses. On the other hand, he is right in not pandering too much to the stickler for gravel. Much of the gravel near Croydon, for instance, rests directly on stiff impervious clay, and after a rain the gravel becomes waterlogged and is much less healthy, in consequence, than the stiff clay itself. These evils, however, are considerably mitigated nowadays, in towns, by efficient drainage. We suppose an ideal site for the erection of a house would be a gentle slope composed of a great thickness of sand.

THE BRICK-EARTHS OF GREAT BRITAIN.—XXXII.

NORTHAMPTONSHIRE—*continued.*

Brixworth and Moulton Districts.

These districts, situated to the north of the city of Northampton, are noteworthy as yielding several kinds of brick-earth, conveniently situated near populous centres. The map, Fig. 1, gives but a very inadequate idea of the sum total of these earths because many excellent brick-earths are found in the superficial deposits in these particular areas, though their precise boundary lines have not yet been accurately determined or published by the Geological Survey. We can say this much, that very good superficial brick-earth exists near Moulton Park Farm, where there has been a brick-yard for many years, and the product is highly satisfactory, though we believe that the main section there is in the Upper Estuarine Clays, of which more presently.

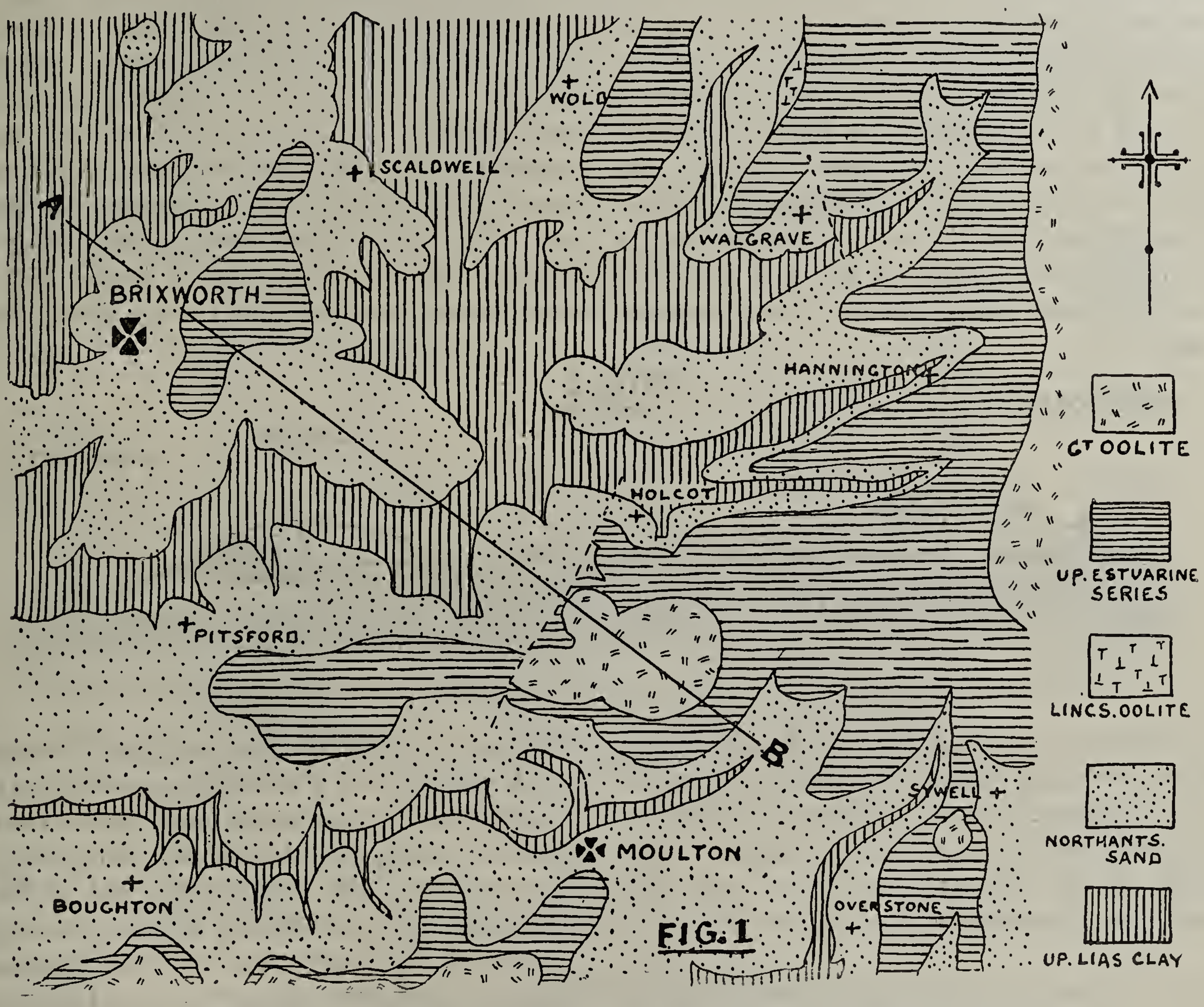

Fig. 1.—Sketch Map of the Brick-earths in the Brixworth and Moulton Districts.

That superficial brick-earth extends over the whole of the high ground in the neighbourhood, including Park Barn and Moulton Park itself.

Turning to the district near Holcot, and to the south of that place (see map) it may be said that the whole of the solid deposits there are covered over by superficial clays more or less suitable for making common bricks. The high ground half-way between Moulton and Holcot, on which there is already a lime works, furnishes a section in the Boulder Clay, though the stones are well enveloped in a suitable brick-earth. Whether under these somewhat adverse conditions the brickmaker would consider it desirable to work this clay in view of the proximity of the other brick-earths we are about to describe, we must leave him to judge. Similar overlying earth of considerable thickness is found to the east of Pitsford, where it obscures the junction of the deposits beneath; and, indeed, the higher ground near Hannington and Walgrave, all of it, bears the Boulder Clay with which the bulk of the solid beds are covered.

In studying the map, Fig. 1, that must be clearly borne in mind, for unless the brickmaker is prepared to dig through a considerable thickness of Boulder Clay, and to utilise this latter, he will be practically unable to take advantage of the excellent clays of the Upper Estuarine Series below. The map is deceptive, however, only in so far as the last-mentioned clays are concerned, and not then if large works prepared to break through the thick superficial deposits are to be established.

Turning to the Drift (superficial) deposits in the neighbourhood of Brixworth, we find that the Boulder Clay is developed on the hill to the east of the village, masking the Upper Estuarine Series beneath. But these latter may be conveniently got at almost all round the base of the hill, as shewn on the map. Practically the same observations apply to the higher ground to the east of the Wold and again near Sywell and Overstone. The value of the Boulder Clay in these districts, for brickmaking, is not great, for, in addition to the trouble of having to get rid of the stones, there is no convenient railway carriage for the bricks when made. All the same, we cannot neglect the district because, as mentioned at the beginning of this article, the district is populous and growing, and could doubtless take all the bricks made without reference to railway carriage. There is, however, all the difference between the value of a brick-earth which pays to take away, and one which does not.

FIG. 2.

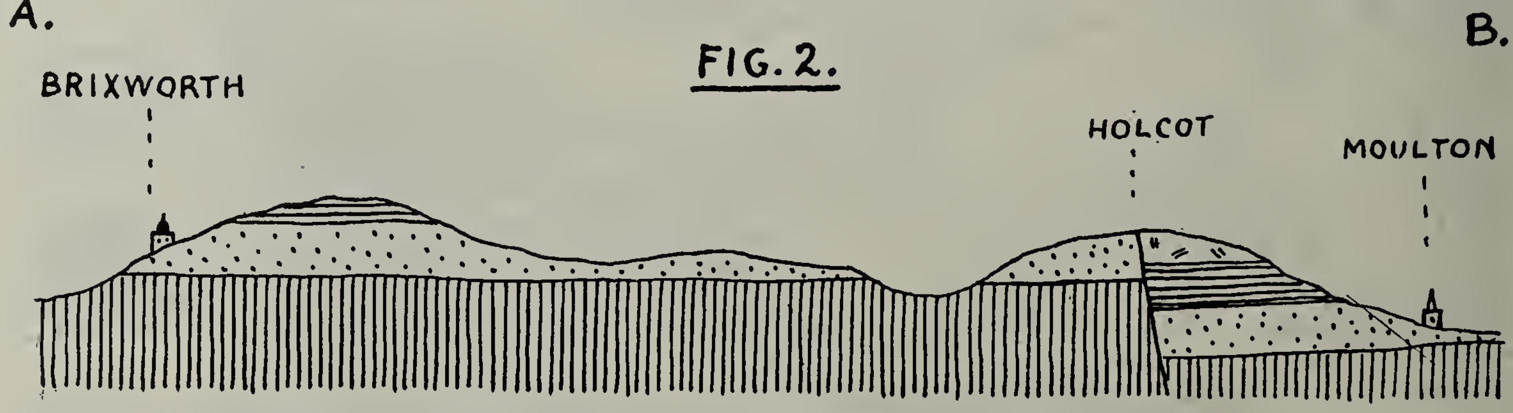

Fig. 2.—Section along the Line A—B in Fig 1. (N.B.—The symbols employed in both figures are the same.)

Let us now consider the solid deposits represented on the map (Fig. 1). Commencing with the uppermost deposit we find the Great Oolite is but sparingly developed, the principal tracts being to the north of Moulton, and a mile or two south of that place. This deposit consists of white limestone and clay, and, speaking generally, is not of much use to us, except where the other brick-earths could be profitably fortified by a little lime, and there are several lime-kilns in the area.

The next deposit, the Upper Estuarine Series, is plentiful enough, but as already observed is largely covered by the Boulder Clay. Nevertheless, at several points it can be readily dug, as for instance, about half-a-mile to the South-west of Moulton on the hill slopes, one-third of a mile north and west of Sywell, and at several places to the immediate East of Brixworth. It is a fairly stiff clay, laminated, and of variable composition. Some beds contain but little sand, and whilst none of them could be termed a loam, certain horizons are somewhat more sandy than others. The clay does not shrink very appreciably, and the bulk of it is suitable for making ridge-tiles, pantiles, rough pottery, and the like, as well as bricks.

The Lincolnshire Oolite is only found in the district, just to the north of Walgrave, and is of no value to us. The Northamptonshire Sand, however (like so many names given by geologists to deposits), belies its name. One would think it was all sand, but as a matter of fact, it has the Lower Estuarine Series incorporated with it, and this latter is mostly clay, and is suitable for brickmaking. It is difficult to select good spots where this clay can be satisfactorily worked without being impregnated with too much iron. As a rule, the most likely positions are near the fringes of the deposit (as shewn on the map, Fig. 1), and where these latter are lying direct on the Upper Lias Clay.

We have described the Upper Lias Clay in Northamptonshire before, and as it is so homogeneous we have nothing to add to our previous observations. It is, everywhere, suitable for making a good brick, and being found in the present districts chiefly in the valleys, and on the lower ground generally, possesses many facilities so far as carriage is concerned. The areas where it is best developed (see map) are to the north and north-west of Holcot; to the south and south-west of Walgrave, near Scaldwell and Wold; to the north-west of Brixworth, and in the bottom of the long, straggling valley to the west of Moulton. Its thickness has not yet been satisfactorily obtained, but, speaking generally, it must attain to a depth of at least 150 feet—and that is plenty to work upon.

The section (Fig. 2) gives an idea of the underground disposition of the solid deposits mentioned, between the towns of Brixworth and Moulton. It will be noticed that there is a fault near Holcot, which throws the beds down somewhat, and possesses the advantage of causing a greater yield of the Upper Estuarine Clays than would otherwise have been the case.

Arthingworth and Lamport Districts.

These districts are situated to the north of the last-mentioned, and, the same deposits being developed in both areas, we have but little to add to what has already been said. The Upper Estuarine Clays are still much covered over by Boulder Clay, as may be seen in the neighbourhood of Draughton and Faxton, and the Estuarine Clays themselves vary but little. A glance at the map (Fig. 3) shows the general distribution of the various solid deposits. The Lincolnshire Oolite, so well developed to the northward of these districts, here dies out, as may be seen on studying the section (Fig. 4). The Northamptonshire Sand is broadly spread near Lamport and Draughton, but is too ferruginous to be of much use to the brickmaker. The Upper Lias Clay is still of great thickness, and eminently suitable for making good bricks. It is especially well developed at and near Arthingworth, to the east and south of Maidwell, and to the south and south-west of Faxton.

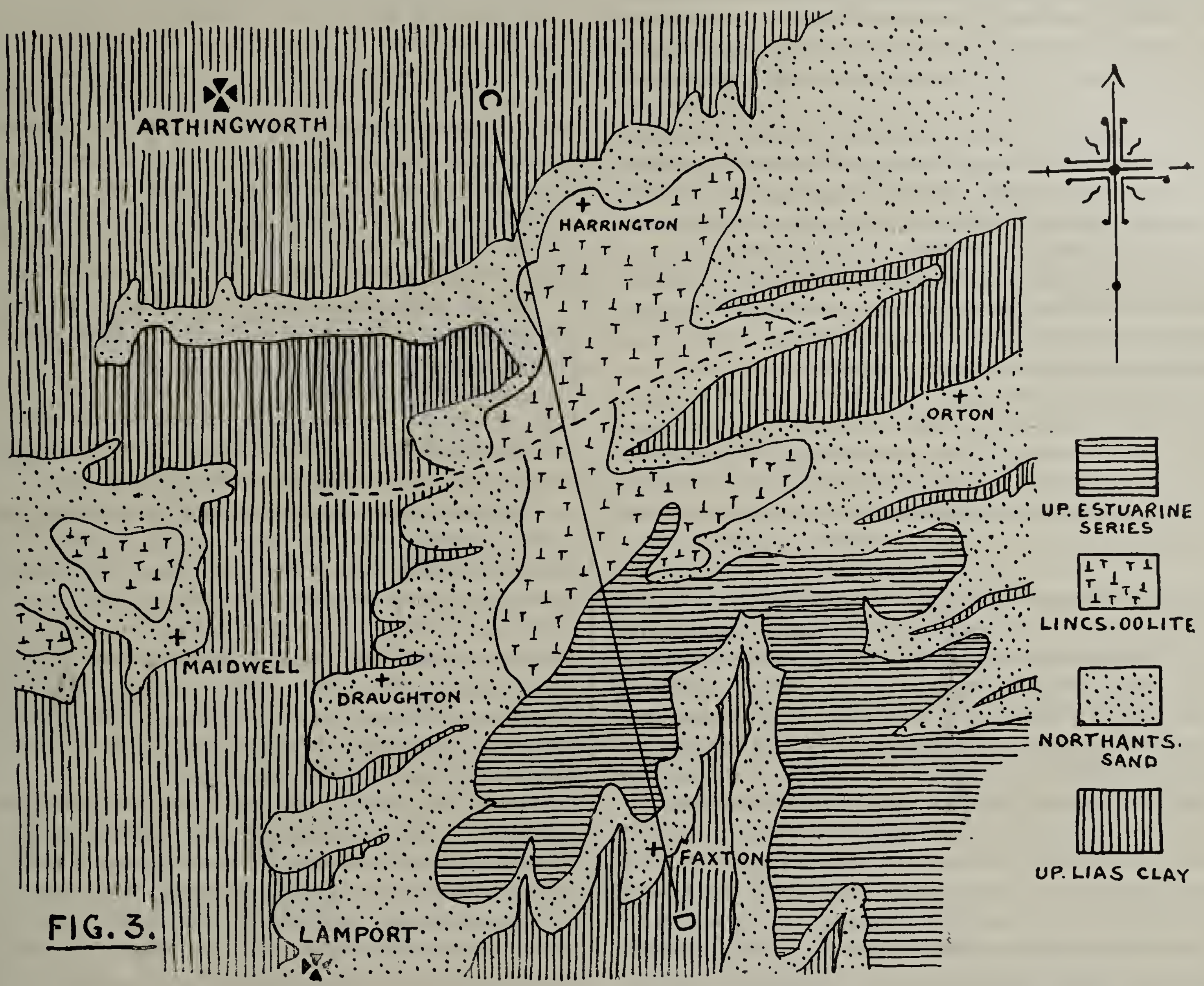

FIG. 3.

Fig. 3.—Sketch Map showing the Distribution of Brick-earths in the Arthingworth and Lamport Districts.

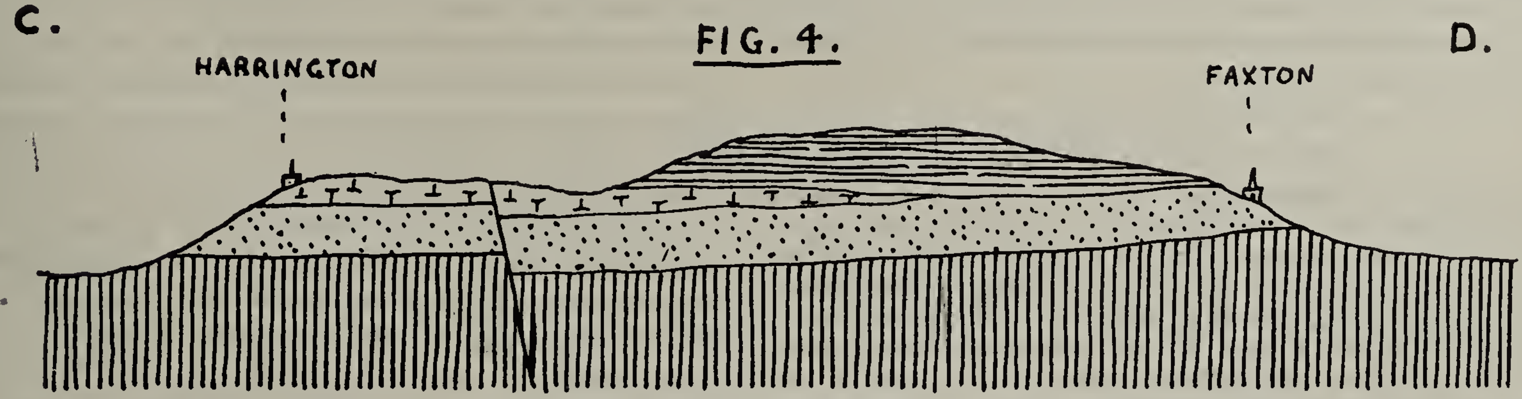

FIG. 4.

Fig. 4.—Section along the Line C—D in Fig. 3. (N.B.—The symbols employed in both figures are the same.)

Fig. 4 shows the general structure of the country in section, between Harrington and Faxton. It will be readily understood from what has already been said.

THE "WEATHERING" OF CLAY.

THE time-honoured method of digging clay and, after spreading it out, leaving it for some time to be dealt with by the atmosphere, is largely followed to-day and is certainly not to be ridiculed. The weathering of certain kinds of clay leads to material changes in regard to some deleterious ingredients of which it is formed. Take, for instance, iron disulphide which may be present as marcassite or iron pyrites. The substance on being decomposed by the atmosphere, parts with its sulphur to a large extent, and in the kiln becomes much less volatile than would otherwise be the case. This means less probability of discoloration so far as the goods are concerned, and a general improvement all round. It ought not to be forgotten, however, that the pyrite is less susceptible to weathering than is the marcassite; fortunately for the clayworker the iron disulphide when present in clays is most commonly the latter mineral—so the weathering is distinctly useful in that direction.

Another common ingredient of clays is the mineral selenite, a hydrous form of sulphate of lime, and ordinarily known as gypsum. This breaks up readily under atmospheric influences, and much of the lime and sulphur is thereby removed from the clay. The presence of the lime would in the majority of cases be an unimportant factor, but it is better to get rid of the sulphur.

A general effect of weathering is to cause the clay to become more open, and to be rendered more homogeneous than when first dug. Through the action of frost, the clods of clay are broken up, and crumble to pieces. It is generally assumed that frosts and rapid and alternating thaws do the clay most good. After being left to weather during winter, the clay is drier on the whole, and there seems to be less tendency to shrink in the kiln, though on this last point we are not entirely satisfied.

In cases where practically no selenite, marcassite, or pyrite exist in the clay, and it is not a particularly plastic clay, it is doubtful whether the operation of weathering does much material good. And where the brick-earth is in the nature of a marl, it may be more conveniently broken up by artificial means. In practice it amounts to this, that where the weather is capable of removing or partially removing some deleterious ingredients from the clay, and where by similar action the clay is broken up, the weathering does some good; otherwise there is not much object in the weathering, and the expense entailed in spreading the clay out is hardly justified.

BRICK-PAVING.

THE paving problem, from all accounts, seems within measurable distance of being solved in the United States. From our namesake across the water we gather that one of the most important sessions of the National Brick Manufacturers' Association just held, was that devoted to the paving brick interests. There was a time in the history of paving brick when certain excuses and apologies had to be made in connection with the use of this material. Those who have been foremost in introducing this product have always realized its possibilites, but they have had many difficulties to overcome, not the least of which was the establishment of a standard quality of product. This has been accomplished. The manufacture of paving brick is no longer an experiment. Formulas have been deduced and methods have been accommodated thereto in a manner which makes it an established industry in which there is no question as to the proper methods to be pursued in developing that which is satisfactory and reliable. The manufacturers of paving bricks now know definitely the character of the product required. We congratulate our American friends.

GLAZED TERRA-COTTA.

SOME ESSENTIALS IN MANUFACTURE.

IT HAS BEEN WELL SAID that time is a great innovator The developments of recent years, in connection with the variety of the manufactured wares, and in working principles of manufacture, as observed in the clayworking industry, all bear abundant testimony to the truth of the assertion. One must indeed keep abreast of the times or, perforce, stand down. The conditions of manufacture of to-day are wholly dissimilar to those within the memory of many old clayworkers, happily in our midst, whose recollections cover some forty or fifty years of more or less active participation in the work.

From the plain, rough, hand-moulded brick, innocent of any set qualities or properties in particular, we have arrived at the glazed, coloured, and ornamental, on the one hand, and the brick of specific properties, *i.e.*, the acid, basic, etc., on the other, made, for the most part, by mechanical means. From such humble beginnings have sprung the now extensive manufacture of plain, ornamental, and glazed terra-cotta.

THE ESSENTIAL WORKING QUALITIES of pottery and of clay wares generally, with particular regard to architectural and industrial requirements, are permanence and durability in the presence of acids, alkalies, and moisture; and, in very many cases, the ability to withstand considerable variations in temperature. Close and accurate working are, in most cases, important factors in the conduct of modern clayworking operations. However, it is with the quality of durability, in relation to bodies and glazes, and that in its widest sense, that this paper is more directly concerned.

It would be difficult to put into words the exact functions of a glaze, or enamel; since opinions are divided on the subject. The varied composition found in connection with glaze mixtures, and the many circumstances governing their employment and use, with particular regard to the bodies they cover, all tend to widen rather than lessen the area embracing the field of enquiry. In certain cases the use of a glaze, or enamel, is imperative; in some cases optional; while in other cases the use of a glaze or enamel may be said to be wholly unnecessary, and even harmful. A glaze or enamel may be, as it often is, employed in clayworking operations, for masking the colour of the body, or for giving some degree of stability to the body the glaze covers. This in order that the wares may be employed for purposes for which, without the glaze, the body in itself would be altogether unsuitable; and which, even with the glaze thrown in, is often of doubtful worth. Then again, a glaze, or enamel, may exist on a body for purely decorative or artistic effect; irrespective of any considerations that are, theoretically, supposed to govern the life and stability of the wares; that is from a strictly utilitarian point of view. And, lastly, a glaze may exist, in conjunction with a body, to their mutual benefit; free from any element of weakness on either side, wherein the maximum, as regards permanency and durability, is practically attained. But this happy combination — often due to purely fortuitous circumstances—is, unfortunately, rarely met with in pottery. Clayworkers are only too well aware that some of the more vital and important questions, falling within the sphere of practical potting, turn on circumstances that are rather more directly concerned with the treatment of the materials, and the general manipulation of the wares, in the course of manufacture, than with matters pertaining to the composition and relative proportions of the materials comprising the mass.

IN TAKING THESE TWO POINTS as our objectives: they practically cover the whole scope of the enquiry—it is at once evident that impermeability must of necessity be an important factor or qualification in the finished wares. For architectural work—as indeed with most wares of a technical character—too much is commonly expected from the glaze. The best of glazes must suffer in the presence of a body unsuitable for the work. Glazes, even when the bodies they cover are sound as bodies go, are subjected, as will be presently shown, to treatment at the burner's hands. That is, in itself, often bad enough for the future of the wares, without the help and assistance of bodies chemically and physically unfitted for their reception, and whose working qualities may be altogether beneath notice. Superior hardness and density are essential qualities, for most purposes, in pottery particularly in the face of atmospheric changes, and the insidious and disintegrating action of moisture, which from its solvent character, coupled with varying quantities of soluble salts held in solution, is generally more or less destructive to pottery. A tough, tight, semi-vitreous body, were it not impracticable for general use, would give the highest degree of durability, and the best all-round working results, under most circumstances and conditions—work at high temperatures excepted. But such a body could hardly be used in connection with glazed terra-cotta; where shrinkage or contraction must necessarily be small, and any conditions favouring distortion studiously avoided. Under these circumstances there is but one way open, the clayworker must grind, pulverise, and sift his raw materials into a much finer state of division than is commonly employed for the work; the finer the better. It will be observed in passing, that such treatment would mean a very considerable advance in the cost of production; both as regards labour and plant. However, such a body, given a suitable glaze, is the only one possible for clay wares, as used in connection with architectural terra-cotta; or indeed as used in the arts generally; that is, if anything like permanence and durability are to be expected in the manufactured wares. It is surprising how excellent a body may be obtained by this method; clays, otherwise open, dry, and somewhat soft—even after hard burning, will be found to give an altogether superior body; compact and close enough for most purposes. Indeed, the bringing of the raw materials into an extremely fine state of division, is the secret of much of the success that has been attained in the higher walks of the clayworking industry.

SUCCESS OR FAILURE WITH REGARD TO GLAZED TERRA-COTTA, and, incidentally, to glazed pottery in general, without exception, is really dependent on many considerations. Let it be supposed that the prepared body leaves nothing to be desired; there still remains the glaze. It is a well-known axiom in pottery that the glaze and body should fail together. But the principle, as applied in the way of a practical test to glazed terra-cotta, is generally confined to the crushing strain, the glaze being subjected to the action of powerful and concentrated acid, by direct immersion, or by long exposure to rising fumes within a restricted area. With the former test little or no fault may be found, theoretically; but unfortunately for this test it frequently happens that the results are contradictory. It is quite possible to get three or four blocks of glazed terra-cotta, absolutely identical in size, shape, and composition, but burnt in different kilns, or even in one kiln. As the result of different burnings it will be found, on subjecting the blocks to the test, that serious gaps as existing between the respective figures obtained, will at once prove the truth of the assertion. Though the conditions be equal as to the size, material, make, and composition of the finished wares, it will be found on investigation that accident rather than design governs any observed agreement between them. The same blocks, burnt side by side in a given kiln, would, apart from the value of the particular index of resistance attained, at least exist together in closer agreement than were they separated in the burning.

THE ACID TEST will prove equally unreliable, and quite as delusive. In the first place, the same conditions prevail as regards the burning, as already instanced, though the effects may be less pronounced. Secondly, the great strength of the acids employed are quite outside and beyond the scope of the enquiry; particularly in connection with glazed terra-cotta. As a matter of fact atmospheric changes, with moisture containing mere traces of acid or alkali, are often far more destructive to glazed terra-cotta than are strong acids. It may be taken that a glaze which resists the attack of water, will also resist acids and alkalies, the relative resistance of all varieties to any of the solutions being the same. A little water is more destructive than much. It is interesting to note the varying influences of minute quantities of given bodies on the solvent power of water One per cent. of carbonate of soda in water will dissolve ten times as much of a glaze than if the water be pure. On the other hand, so minute a quantity of hydrochloric acid as ·02 per cent. added to pure water will stop the action of the water on the glaze. The solubility of a glaze is largely influenced by the condition of the surfaces from weathering in the presence of carbon di-oxide, water, and the air. However, after an interval a good glaze will be less soluble in water than a bad one, though previously equal. A rising temperature is not without influence on the solubility of a glaze; for each degree centigrade, the power of the solvent is increased by some 10 per cent.

THE SOLUTION OF A GLAZE IN WATER is caused by a decomposition, by which free alkali is formed. The silica is then dissolved, as a secondary action, by the free alkali in solution. Glazes rich in silica are easily acted on by alkalies and, conversely, glazes rich in alumina are easily acted on by acids. This is awkward for the clayworker, since the proportions of certain constituents, so necessary for the highest power of resistance in a glaze, are not exactly conformable with the physical and chemical properties of the usual clay bodies employed in the work. Clay shrinks at all stages, with exception at the stage taken at an initial temperature, immediately preceding the fully vitreous state, and under reducing influences. Hence the presence of definite quantities, chiefly in the way of silica and alumina is necessary, since the perfect adjustment of the glaze turns on the general behaviour of the body the glaze covers, after the addition of the glaze, up to and including the final burning of the wares. It has been proved, as the result of direct experiment, that the highest powers of resistance to moisture, acids, or alkalies, are to be found in a perfectly vitreous body of the following composition:—

Silica	74·4	per cent.
Alumina	0·7	„
Lime	8·8	„
Alkalies	16·0	„

But this is hardly practicable in a glaze, inasmuch as quite ten per cent. of alumina is necessary for most glazes or enamels, together with, say 60 per cent. of silica, the alkalies standing at about 11 per cent. However, it is satisfactory to note that the presence of lead silicates—more common to glazed terra-cotta than to general pottery—and, even the presence of zinc, are both conducive to greater insolubility on the part of the glaze.

But this is not all. Let it be supposed that the compositions and adjustment of the glaze and body are as near perfection as one could reasonably expect them to be. There yet remains a strong element of danger, in many cases altogether unsuspected, in the burning. A piece of ware, dry and ready for the kiln, may be burned at any particular temperature, as selected by the clayworker, falling within a very considerable range at the two extremes. It may be burned at a temperature —1,000° C.—giving in effect a linear contraction of two per cent. Or the clayworker may prefer to work at 1,100 C. with a shrinkage of six per cent. It may be possible to reach 1,200° C. and a contraction of 10 per cent. with an effort. However, the many variations possible and falling between two and six per cent. are more than sufficient for purposes of illustration. Two per cent. works out, in round numbers, at a quarter of an inch in each foot. Six per cent. would be equivalent to the loss of a shade under three-quarters of an inch to the foot. And this variation is possible, in lesser or greater degree, in accordance with the material used, within a temperature falling between some 200° C. Suppose a glaze or enamel accurately adjusted to a body, which together, under normal conditions, are burned at 1,000° C. with a shrinkage of two per cent. What a difference in the contraction or shrinkage a matter of 50° C. either way would make ! Yet this may be easily done in the preliminary burning or "biscuiting," or in the final burning of the wares. In any case, so small a matter as one per cent. would give one-eighth of an inch difference in the foot ; under such conditions the stress or strain, as existing between the body and the glaze, could be perhaps better imagined than described ; permanence and durability in the finished wares—even if they survived the cooling off in the kiln—would be out of the question. There is, unfortunately, much ignorance, particularly on the part of burners, on these matters. It is not too much to say that these minute differences in volume or shrinkage, so easily brought about in the burning, are at the bottom of nine-tenths of the shivering, crazing, and stunting that occurs in pottery ; particularly in the manufacture of glazed terra-cotta. For all sections of the clayworking industry, wherein glazes or enamels are used, the importance of taking exact trials in the way of shrinkage or contraction, in conjunction with glaze proofs, cannot be too strongly insisted upon ; the two must be taken together, during the actual burning of the kiln ; otherwise disappointment and loss will be frequent and severe.

The late Mr. Joseph Cowen.—We much regret to announce the death, at the age of 69, of Mr. Joseph Cowen, formerly member of Parliament for Newcastle-on-Tyne, and one of the best orators and most independent thinkers of his time. He was a generous and considerate employer of labour. Mr. Joseph Cowen's father, Sir Joseph Cowen, spent a great part of his life in the successful endeavour to restore the river Tyne from the condition of a shallow ditch, unfit for navigation by anything better than coal barges, to that of a valuable and important harbour and river channel. Mr. Joseph Cowen was a considerable employer of labour in brickmaking and other directions, and his original brickworks date back over 150 years. His works, including the colliery, extend over between 200 and 300 acres, and the fire-clay is obtained from nine different seams. The present output of the firm represents some 10,000,000 fire-bricks, together with other fire-clay products.

BRICK DRYING.—III.

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Other Forms of Hack Roofing.

Two more forms of erected hack roofing should be mentioned before leaving this part of the subject. The construction illustrated in Fig. 16 is very convenient for covering bricks which do not easily crack and warp if dried quickly. The roofing is higher from the ground and consequently admits of more ventilation than that previously described. At the same time the form of framing renders the whole more rigid, and less dependent on the strength and soundness of the individual posts. Loose boards braced together in 10 or 12ft. lengths, 2ft. wide, which may be shifted as desired to either side of the gangway, give a means of protecting the bricks against driving rains.

Continental authorities recommend the use of racks covered singly with roofing as shown in Fig 17, or in pairs ; the gangway between the racks in a pair being under cover. The chief advantage claimed for such arrangements lies in the fact that the bottom rack is placed higher above the ground, and the lowest row of bricks is better and more quickly dried than is possible with the usual method of hack setting. It is stated that a brick will dry at a height of 9ft. above the ground level in half the time it will when set on the ground.

It is doubtful whether this system can really be recommended for out-of-door drying, in consequence of the great extra cost of construction, and also because the bricks would require much protection and watching, to keep them from drying too rapidly.

It is a system which may be adopted to advantage under large shed roofing, where a better class of brick is made, and where no special means are necessary for the protection of the individual racks against wind, sun and storm.

Frost.

Before quitting the subject of out-door drying, a word is necessary on the subject of frost. The season for out-door drying is restricted, by the consideration of danger of freezing, within narrower limits than would be imposed solely by the question of the drying capacity of the air. March winds are proverbial, and fine weather often entices the brickmaker into an early commencement of out-door making ; yet both in March and April severe frosts sometimes occur, which would destroy newly-made bricks exposed on hacks. Similarly in the latter half of October, and early in November, fine weather is frequent enough to make the brick manufacturer regret that he has not prolonged his making season by a week or more. Yet, in the usual way, he dare not do so, for fear of unexpected frosts.

Forecasting Night Frosts.

There is, however, a way of forecasting the occurrence of a night frost, in the course of the preceding afternoon, which if more commonly known and practised, would enable brickmakers to take precautionary measures, in time to save their bricks from its effects. One may even foretell the mean temperature of the following day by the same means, an hour before sunset.

The only instrument required is the "wet and dry bulb thermometer," illustrated on page 316 of the January issue (Fig. 1). It has been established by a long and careful series of observations, that the reading of the *wet bulb* thermometer *in the shade* between two and three in the afternoon exceeds the lowest air temperature of the succeeding night by 7¼ degrees

Fahr. One has, therefore, only to take the wet bulb reading at that time, and deduct from it seven degrees, and if the resulting figure is less than 32 deg. there will certainly be a frost during the night. Similarly the reading of the wet bulb thermometer one hour before sunset will give the air temperature at eight o'clock on the following morning, which corresponds approximately to the mean for the day. It is necessary to keep the apparatus in good working order by occasional washing of the wet bulb covering and wick, and it is also essential to place the thermometer in the shade and in a place where warm buildings cannot influence its readings by radiation. The reading given by the thermometer with the uncovered or dry bulb is not of any import in these forecasts.

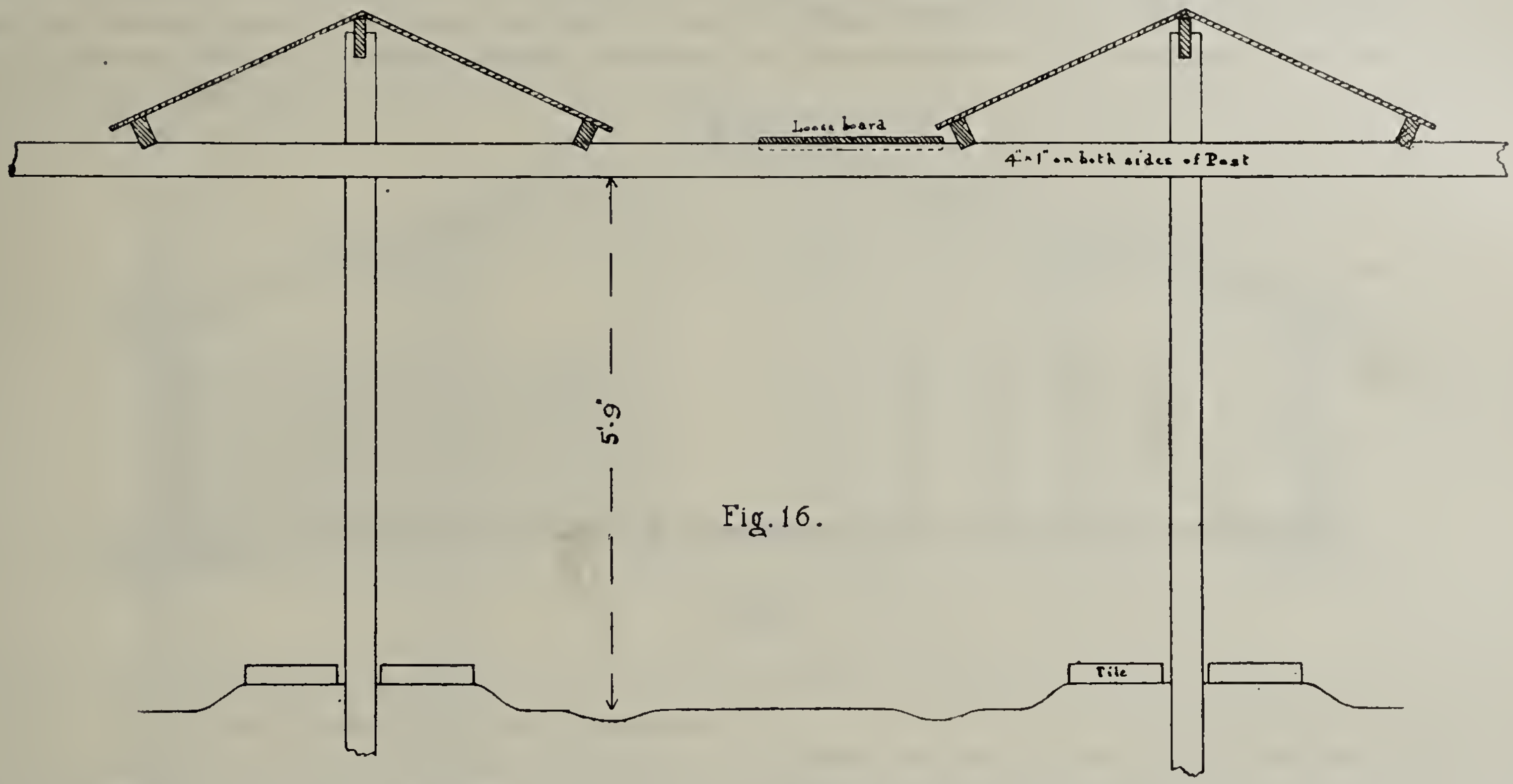


Fig. 16.

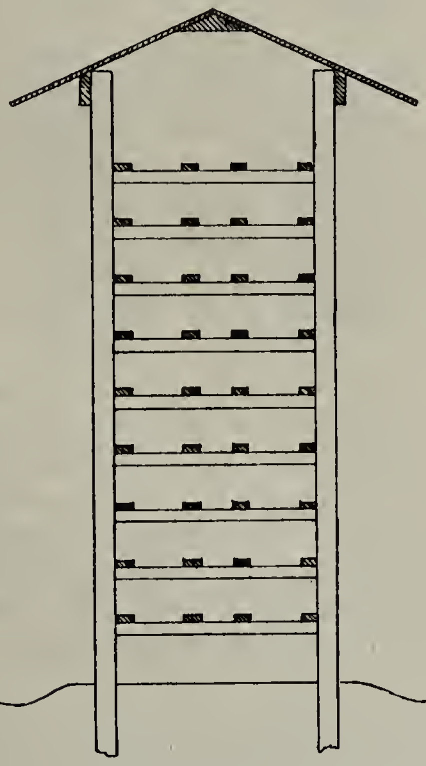


Fig. 17.

This rule is absolutely reliable on the Continent, but is naturally not quite so certain on our Island, because of the proximity of the sea, and the sudden changes of wind. Nevertheless, it is of great value, and is well worthy of the attention of makers who are anxious to use every available day of the year for out-of-door brickmaking.

WORKING COST OF HACK DRYING.

All the appliances described above, are the outcome of many years' practice, in the endeavour to contend against the vagaries of the weather, so that no expenditure should be incurred in the consumption of fuel for drying. The working cost of drying bricks is thus confined to the cost of labour and repairs. It will be interesting in the course of these articles to make careful comparisons between the various systems described, with a view to ascertaining which is ultimately the most economical form of drying to adopt in brickmaking. The reader must, therefore, be asked to reserve judgment on the whole question till all the figures are given, after which there should be an extremely good opportunity for those who are interested in the subject to give their practical experiences.

It will be seen that the cost of equipping a hack ground for an output of a million bricks yearly, is from £150 to £250, according to the completeness of the installation.

The repair bill for the same ground is rarely less than £25 per annum, when the cost of labour in the spring involved in preparing and clearing up the ground, and that in clearing up and storing the material in the autumn is considered. The loss from damage to bricks by weather and rough treatment on hacks is difficult to assess, but it is always considerable, even in the most carefully managed yards, and cannot be put at less than 5 per cent. on the make, or say, 4d. per thousand.

The labour of wheeling bricks to the hacks, hack-setting, skintling, looing, and general attendance, and finally wheeling to the kiln when dry, costs upwards of 2/6 per 1,000.

Taking therefore, all into account, the cost between the machine or mould and the kiln cannot be put at less than 3/3 to 3/6 per 1,000. This may be considered as the amount actually expended on drying common bricks on hacks, and is the figure which must be carefully verified by each particular maker, when comparing the system with others.

Drying Sheds.

The next step in the evolution of drying systems is the erection of sheds of more or less considerable extent. The sheds themselves may be simple structures in wood or in brick, roofed with tarred felt, tiles, slates or galvanized corrugated iron. It is necessary to provide adjustable appliances for ventilation, in order to carry off the moisture dried out of the bricks.

Beneath this protection, the bricks may be set in longitudinal or transverse hacks, but if the brick is of a quality common enough for this method of treatment, it is at once cheaper in first cost, and more efficient in rapidity of drying, to use the out-door hacks already described.

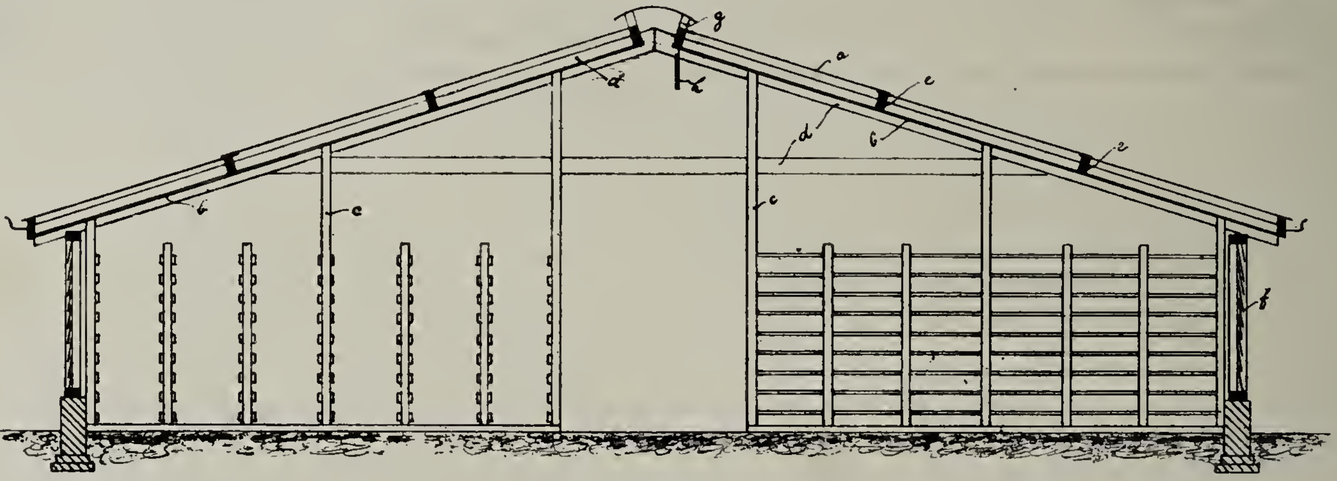


Fig. 18.

Bricks may be efficiently dried if set in rows on an evenly sanded floor, but this method, without artificial heat, does not give an adequate output.

The only system which is practically efficient without artificial heat is that of setting the bricks in racks.

Racks may be placed longitudinally or transversely in the shed. The ventilation of a shed is, however, transverse, and it is much better to place the racks transversely. It may be urged that it is surely better to pass the air for ventilation through the racks of bricks rather than between them. It will be readily understood, however, that with natural aëration, the currents of air are usually but feeble, and the first rack will considerably reduce their power. The rack next the direction of the current too, is exposed too openly to its effects, and is dried too quickly, and further, when the current has passed through one or two racks, the air is so heavily charged with moisture that it is no longer of value for drying. In the use of transverse racks, on the other hand, the bricks are not directly exposed to the sharp currents of air, which, sweeping unretarded through the gangways, carry off the moisture diffused out of the bricks.

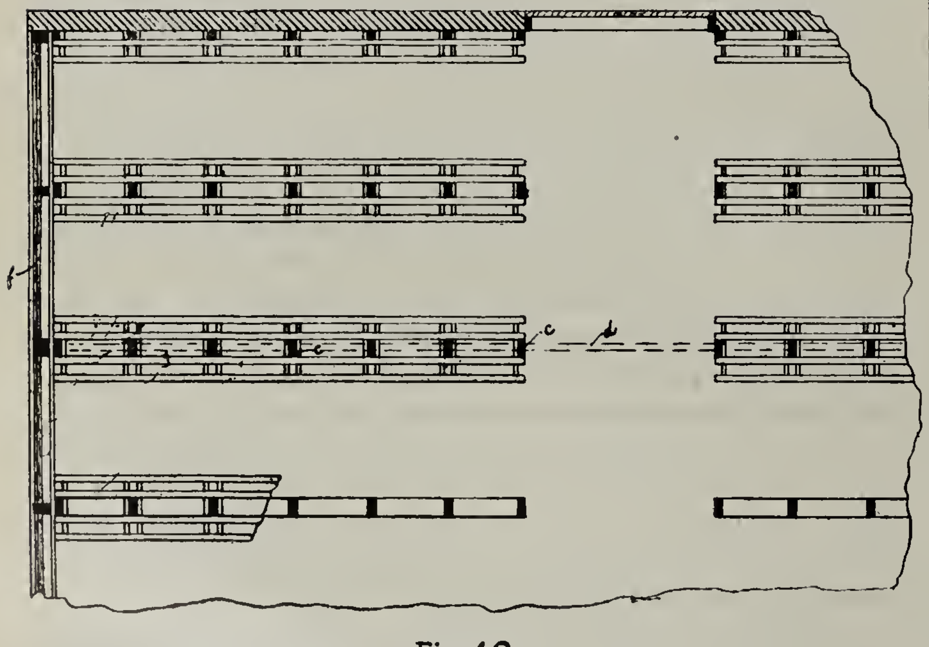


Fig. 19.

The transverse rack system is practically the only one used on the Continent, and is minutely described by the German authorities on brick making, not only because of its use in simple unwarmed sheds, but also because of its wide adoption in buildings covering Hoffmann kilns.

A simple unwarmed shed may be 36ft. wide and 150ft. long inside, with a gangway 6ft. wide down the middle.

The illustration given here (Fig. 18) of such shed, in cross section, shows a galvanized corrugated iron roof (*a*) with ½in. matchboard lining (*b*). The posts (*c*) and principals (*d*) may be 10ft. apart to suit the racks, and the purlins (*e*) complete the roof framing.

The sides may be fitted with a double row of hanging shutters, or with adjustable Venetian shutters (*f*); or again, brick walls may be built to carry the roof with a series of windows, and rows of perforations in the brickwork. Ventilation is also provided for at the ridge (*g*) by setting it a couple of inches above the roofing.

An adjustable row of shutters 5ft. long, may be provided to close this space, as shown at (*h*). Fig. 19 is a part plan of the shed.

The simplest Venetian shutter is constructed of horizontal slats 5ft. long, pivoted at both ends at (*a*)—Figs. 20 and 21—a vertical bar (*b*) with handle (*c*) is pivoted at the middle of the shutter, and is provided with pegs (*d*) corresponding to the slats. By turning this vertical bar through an angle of 90° each peg opens the corresponding slat. Fig. 20 shows the shutter in vertical section and part plan shut, and Fig. 21 shows it open. This is the form of side ventilation usually adopted on the Continent.

The racks are 15ft. long, with gangways 3ft. wide between them. Each is constructed 2ft. in width, to hold two rows of bricks on each stage, and the supporting posts may be from 2ft. 6in. to 3ft. 6in. apart. If the bottom stage is only 6in. above the floor, the rack may have nine of them in height, within the workmen's reach.

It is not advisable, on account of the cost of labour, to place bricks higher from the ground than this, though in some systems the sheds are racked close up to the ceiling on each side of and over the main central gangway. Generally speaking, the rack construction costs a sufficiently large proportion of the total cost of the shed for it to be advisable to keep it low enough to be worked without trestles or ladders.

Multiplication of racks, too, will result in the accumulation of too much moisture in the air of the shed except in windy weather.

The fact that so much space in the roof seems unused tempts one to think that an economy can be realised by occupying it with racks. This, however, is a fallacy, which a short experience will rapidly demonstrate.

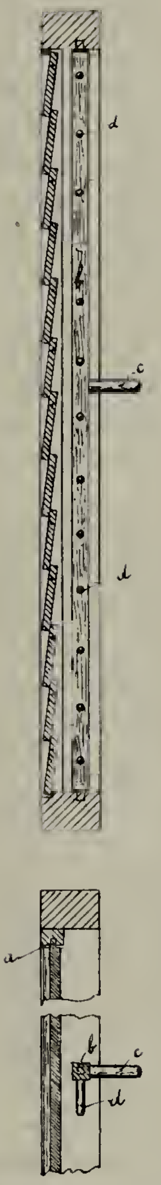


Fig. 20.

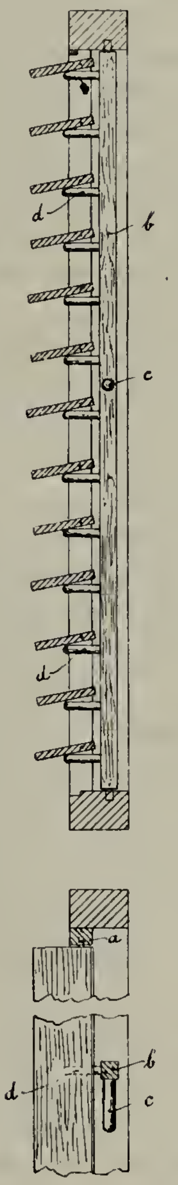


Fig. 21.

On the Continent, it is very largely the custom to cut bricks at the machine in pairs, instead of as many as ten at once as is usual in England. The shed racks are then provided with four slats to each stage, two for each row of bricks. The pairs of bricks are set on these slats on pallet boards. Stout wires sometimes replace the slats either completely or in alternation.

This method of cutting off in pairs has some advantages, for the bricks do not need spacing in order to dry them, the space between the pairs being sufficient. The labour of cutting off, too, is lighter, though more continuous. In this country slats may be similarly provided for hand-made bricks placed on pallets, but there is much to be said for the use of loose boards of convenient length, which may be slipped into the racks on fillets, nailed to both sides of the supporting posts. Boards 2ft. 4in. in length will hold seven spaced bricks on edge, and are of a very convenient length for shed work. They will hold five bricks flat. The supporting fillets should be 7in. from the top of one stage to the top of the next, and the topmost one will then be 5ft. 2in. from the ground. The arrangement of posts and fillets for the reception of boards in this way is shown in Fig. 18 on the left-hand rack. Fixed slats are shown on the right-hand side, and in Fig. 19 on plan.

The contents of one rack 15ft. long will then be :—

Stages.	Wide.	Long.	Bricks.	
9	2	6	7	= 756 bricks.

A shed 150ft. by 36ft. will contain 60 of these racks, giving a total capacity of 45,360 bricks. Allowing three weeks to dry bricks in it, the output is 15,120 per week, and without artificial heat, a yearly output not exceeding 350,000.

Three sheds will, therefore, be required to give the same output as a hack ground of one acre in extent.

If hand-made bricks are placed in the racks flat, and on pallets, the contents of the sheds are reduced by two-sevenths, unless the racks are provided specially with stages closer together. It is really preferable to pitch the bricks on edge on boards, which carry seven bricks each, and may be placed in the racks.

If the clay is liable to crack in quick drying, racks may be constructed in the middle of the shed with a gangway 4ft. wide down each side. In this arrangement the wind does not come so sharply in contact with the bricks nearest the outside.

COST OF SHEDS.

Taken roughly, the cost of constructing such sheds is £1 per foot run, or £150 for a shed without the racks.

The racks themselves, including boards, on to which the bricks may be cut by the machine, will cost about £2 each, or £120. Total cost of shed £270, or for an output of one million yearly without artificial heat, £810. It is evident that this method of protection it much more costly to install than hack roofing.

COST OF LABOUR.

As a set-off against this, the labour is less ; the distance from the machine to the racks, and from the racks to the kiln, is on the average, only one-third, and there is no skintling to be done. The repairs also are insignificant, and there is no preparation required in spring, or storing away of material in winter. The waste by weather and rough treatment should be *nil.* Taking all these points into consideration, the cost of drying bricks as compared with the figure arrived at for hack drying, is from 2/3 to 2/6 per 1,000. But there is a charge to add for additional interest on capital of about 7d. per 1,000.

ARTIFICIAL DRYING.

The next advance in the evolution of brick-drying systems leads into the second main division of the subject, "Drying by smaller volume of air at artificially increased temperature."

It is the most important division of the subject, for the manifold advantages of having the drying process under control are evident, and it can be shown that these advantages really out weigh the disadvantage of the expense of fuel. It is the more intricate division of the subject, because of the different conditions under which heat may be applied to drying and the necessity for obtaining the greatest possible efficiency from the fuel or source of heat employed.

The problem in itself seems simple, for one is apt to assume that the mere warming, say, of a shed, some 10° to 20° above the outside temperature would ensure rapid and effectual drying of the bricks, and would not require much fuel. Scientific calculation, however, throws unexpected light upon the subject, and shows the necessity for great care in the arrangement of artificial systems and for great caution in accepting the statements of interested persons as to the fuel consumed in known systems.

Scientific Principles Reiterated.

In consequence of the importance of the chief fundamental facts, it is necessary to emphasise here the statement made in the January issue (page 315) that no drying can be obtained without absorption of heat. If hot air is passed slowly over a dry cold brick it will be only slightly cooled, but if it is passed over a very wet brick, it will be considerably cooled.

To raise a dry brick weighing 7lbs. from 60° to 61° F. takes only 1·4 units of heat, but to raise in the same way the temperature of a wet brick weighing 7½lbs. and to evaporate at the same time the ½lb. of water it contains, will take 537 units of heat, or nearly 400 times as much. The latter figure represents the heat yielded by the consumption of about ¾oz. of ordinary coal. Not only so, but the heat has *absolutely disappeared*, and can only be recovered by condensing the vapour of the water back into water again.

For this reason the statements which are sometimes made, that certain drying systems use heat over and over again, and that the heat is not allowed to escape, must not for one moment be credited, although at first sight they may seem to be borne out by the system referred to.

It is also very necessary to call attention again to the statements on page 315, of the peculiar property of air of carrying moisture in amount varying with the temperature. The table there given shows that the air at 82° F. will carry double the quantity of moisture which it will carry at 62° F. Its carrying power is approximately doubled for a rise of 20°. Nevertheless, when once the air at a given temperature is carrying its full complement of moisture, and is saturated, the fact that it feels warm, and is kept warm, does not imply that further drying of bricks contained in it will ensue. It is saturated, and cannot take up more moisture, and it is now necessary to carry off this saturated air by ventilation, and replace it by more warm air which is not saturated.

It is by a careful adjustment of the temperature and volume of air supplied to a dryer that the most efficient results are obtained, and it is a knowledge of the scientific principles involved that enables the expert to ensure these results.

Query.—*With regard to diagrams* 2, 3, 4 *and* 5, *appearing in the January issue*, re *Brick-Drying*, *I should like to know how the first stage in drying is so precisely fixed at* 32, 25, 16 *and* 7 *hours respectively, as to give the line-cutting in each case at E. In short, how the point E is exactly determined. Are not considerable variations in time possible? Then as regards volume. The term seems to be employed for both weight and surface measurement, from which certain "volume" units, expressed as per cent., are deduced. The relationship is not clear. So far as I am aware, neither weight nor surface measurement, in connection with unburnt clay, may be directly converted into volume units. Will yon kindly explain what these volume units are and the manner of conversion?*

It would appear from the above communication that the diagrams given in the January number were perhaps not sufficiently explained.

It must be stated that these diagrams are *typical* only of the various qualities of plastic clay and not absolute or invariable.

The method of obtaining such diagrams is as follows :—

Bricks are made of one standard size from various qualities of clay, half-a-dozen or so being made of each kind selected. They are all weighed and measured carefully, and all are placed at the same time in a chamber warmed and ventilated in a uniform manner.

The bricks are maintained in this uniformly-drying atmosphere till they are dry and are weighed and measured at regular intervals. During the first stage they must be very frequently measured, during the second less frequently, and during the third at still longer intervals.

The loss in weight at each measurement gives the loss of water by evaporation, whereas the change in dimensions gives the loss in volume of the brick. The *volume* of water lost by evaporation is easily calculated from the weight by the known relation that one cubic inch of water weighs 0·578 oz.

Now as soon as the loss in weight commences to be greater (in its equivalent volume) than the loss of volume of the brick by shrinkage, the first stage of drying is completed and the point E determined.

The end of the second stage is determined simply by the cessation of change in the dimensions of the brick.

The actual volume of clay in a brick is calculated by deducting the volume of water lost in drying, from the original volume of the wet brick.

The percentages given are percentages of the total original volume of the wet brick, which is taken of course as 100.

The numerical statement of the results of the experiments on, for instance, the clay used for Fig. 3, is as follows :—

Time Drying. Hours.		Volume of brick. Per cent.	Volume of water lost. Per cent.	Consequent volume of spaces in brick. Per cent.
1st Stage	0	100·0	0·0	0
	12	94·0	6·0	0
	25	87·5	12·5	0
2nd Stage	36	83·0	18·5	1·5
	48	80·0	24·5	4·5
	60	78·0	29·0	7·0
	69	76·6	31·0	8·0
3rd Stage	72	76·6	32·0	9·0
	84	76·6	34·0	11·0
	108	76·6	37·5	14·5
	144	76·6	40·0	16·6

The figures are here stated for approximately every twelve hours, to save space and unnecessary detail, but the actual measurements are of course taken much more frequently. The results tabulated are the means of several sets of measurements on each kind of clay.

The Shaw Kilns Co., Newbury.—The final meeting of the shareholders of this Company, the affairs of which have been in liquidation, was held at Newbury, on Friday evening, March 9th, when there were present: Mr. John Flint (presiding), and Messrs. Adey, J. N. Day (liquidator), C. Lucas (solicitor), Horace G. Cox (secretary), and others. Mr. Day produced the balance sheet showing the various items connected the winding up of the Company, and the same was considered satisfactory. Mr. Day pointed out that although the debts due to the Company amounted to upwards of £1,400, that sum had been recovered and paid into the Company's account, with the exception of £5 or £6, which could not be obtained, and this circumstance bore testimony to the careful manner in which the directors had carried on the business of the Company for some time past, and also reflected credit upon Mr. Cox, the secretary, who had rendered efficient service throughout the liquidation proceedings.

MECHANICAL DRAUGHT FOR CONTINUOUS KILNS.

To the Editor of "THE BRITISH CLAYWORKER."

SIR,—In your December issue we gave an instance of our success in drying bricks with waste heat drawn by fans from independent kilns and circulated in tunnel dryers; but we questioned the practical utility of using Fan draught on Continuous kilns, pointing out that the circumstances were altogether different, and that no actual economy has been proved, to offset the cost of running the fan and the disadvantage of the inevitable stoppages of an oil engine.

In your February issue our views as to Continuous kilns are challenged in an unsigned article. Your correspondent gives some figures of the volume and temperature of gases removed by a fan from his continuous kiln; and he estimates that these gases should suffice to dry 4,000 out of his daily production of 8,000. His calculations are based on burning 1·54 lbs. coals per minute, or to put it practically, one ton per day, or 2½ cwts. per 1,000 bricks produced; which is economical work for so small a kiln.

Out of this one ton per day, he expects to recover heat equal to six cwts. coal, or 30 per cent., with which to dry 4,000 bricks daily.

Even supposing 30 per cent. of the total heat to be recoverable, it would never dry 4,000 bricks. On a very large scale bricks *might* be dried with direct heat at 1½ cwts. coal per 1,000; but we have never seen evidence of such economy in practice.

Accepting this theory, however, for the sake of argument, we would like to know where a 3-B.H.P. oil engine can be run night and day for the cost of six cwts. dust coal? It is obviously out of the question at normal brickyard prices for dust coal. Thus, on your correspondent's own showing, this method will result in a loss, just as we had pointed out.

We do not think that any experienced engineer will claim that in a properly worked Continuous kiln there is enough heat wasted to justify its removal.

The case is quite different with intermittent kilns; where all the heat given off in cooling is wasted, if it is not drawn away for drying purposes. But even then great care should be taken to find out whether the bricks will stand rapid cooling without injury; and whether there are enough kilns to furnish a constant supply of waste heat.

In one such case, we entirely dispensed with the use of a 200-H.P. boiler, and increased the dryer capacity from 70,000 to 120,000 paving bricks daily, by using such waste heat; and we have many similar installations.

But in nine cases out of ten, the conditions necessary for economical utilization of waste heat do not exist; and then a well-designed steam tunnel dryer, utilizing the exhaust steam from the main-engine, is by far the most practicable and economical means of drying. In all cases it will pay brickmakers to consult experienced specialists and to see what is actually done elsewhere.

Yours faithfully,

Feb. 26th, 1900. THE AMERICAN BLOWER CO.

We give above a further contribution from the American Blower Company, to this interesting subject.

The employment of an oil engine as the source of power for mechanical draught is a side issue and not essential to the subject. We have not pretended to assert that an oil engine is the best source to use; we quoted only an instance where it is successfully used, and in this instance we are assured that the cost of running is repaid three times over by the increased output of the kiln. An oil engine is, rather, a convenient form of power, where the question of transmission from the main engine or boiler is difficult on account of distance.

Our original article in the November issue was designed to show the advantages of induced draught over the employment of large chimneys, even where there is no question of utilising the waste heat from the gases delivered by the fan. When this is recovered we contend for a very marked economy.

The kiln in question was delivering 3,100 cubic feet of gases per minute, at 205° F., and the power absorbed by a fan to do this work would be only 1½ brake-horse-power. The consumption of 4½ gallons of petroleum per twenty-four hours, or 2 cwts. of coal in a small steam engine, would give this power, costing say 2s. 3d. and 1s. 6d respectively.

Our correspondents omit from their consideration the fact that power is also required to deliver air through a steam heater into drying tunnels. A similar volume would require practically the same power, certainly not a great deal less, and the comparison to be made is confined to that between the heat given by kiln gases which costs nothing, and the cost of producing an equivalent amount by means of live steam. The exhaust steam produced in a brickyard will not dry all the bricks made in it, and is only available during ten hours in every twenty-four. The remaining heat necessary must therefore be produced by the consumption of fuel expressly for the purpose if the kiln gases are not made use of.

We have not called in question the value of using the heat yielded by bricks burned in intermittent kilns in cooling, but for common or even high-class goods the use of such kilns is in these days to be strongly condemned on account of the waste of fuel in burning.

With regard to our figures as to the heat yielded by the gases of the kiln in question, we can best further elucidate the matter as follows:—

The gases (186 lbs. per minute) should be reduced in passing through the tunnels to 90° F., giving 186 lbs. × ·237 specific heat × 115° F. = 5,069 British Thermal Units per minute.

Now in drying two bricks and three-quarters per minute (4,000 per day), we must in the tunnel system take account of the following points:—

The bricks will issue when dry warmed to about 160°
The trucks will issue when dry warmed to about 200°
and we may take it that they enter the cool end at 50°.

Heat absorbed therefore is:—

lbs.	specific heat.		B.T.U.	
22	× ·2	× 110° =	484·00	to warm the clay to 160°.
2¾	× ·1	× 40° =	110·00	to warm the water of manufacture to 90°.
1⅜	× ·1	× 110° =	151·25	to warm the hygroscopic and combination water in the dry brick to 160°.
6	× ·114	× 150° =	102·60	to warm the iron truck to 200°.
2¾	× 1150	(latent heat) =	2887·50	to evaporate the water dried out of the brick and issuing in vapour at 90°.
		Total ...	3,735·35	British Thermal Units.

Deducting this amount from the 5,069 B.T.U. yielded by the kiln gases, we find 1,333·65 B.T.U., or 36 per cent. allowed for loss by radiation, &c., from the tunnel, a margin allowed by all authorities to be sufficient in a good tunnel.

We still think that our correspondents as well as other drying experts would do well to accept our suggestion of going fully into this important subject.

CLAY AND SAWDUST MIXTURES.

WEIGHTS AND RESISTANCES.

In order to obtain some accurate data regarding the weights of various mixtures by volume, of clay and sawdust, the following specimens were carefully made and burned, and gave some interesting results. The clay represents a fair average sample as used for fireproofing in a certain district in America.

Starting with pure clay and water, the following mixtures were made :—

BY VOLUME.

No. of specimen.	Per cent. sawdust.	Per cent. clay.
0	0	100
1	10	90
2	20	80
3	30	70
4	40	60
5	50	50
6	60	40
7	70	30
8	80	20

Six cylindrical shaped blocks of each mixture were then made by means of a small hand-press, and compressed with about 200 lbs. per square inch. The No. 8 mixture had the greatest amount of sawdust that could be held together. After being thoroughly dried in an oven, they were then "burned" in a gas blast furnace, the temperature therein being maintained as near as possible at 2,000 degs. F. (about the melting point of copper). Specimens Nos. 0, 1, 2, 3, which were in a slightly hotter part of the furnace, were removed after four hours and fifteen minutes, parts of their surface being slightly vitrified. Specimens 4, 5, 6, 7 were removed fifteen minutes later, and were also near the point of vitrifaction on the surface. Specimens of No. 8 did not hold together, and were broken when removed from the furnace. It would appear as though the difference in time of burning for different mixtures in blocks of equal size was nil ; however, on a large scale conditions are so different that the time of burning may vary. Nevertheless, it would seem that if blocks can be burned on a small scale in four and one-half hours, that kilns that require from ten to forty hours could be improved.

The specimens after burning were carefully weighed, and their respective volumes ascertained by displacement (fine sand being used), from which the following weights per cubic inch were obtained :—

No of specimen.	Weight per cubic inch [in lbs.]	Weight per cubic foot [in lbs.]
0	·0845	146·01
1	·0808	139·62
2	·0713	123·20
3	·0645	111·45
4	·0596	102·98
5	·0474	81·90
6	·0371	64·10
7	·0244	42·16

Fig. 1 shows graphically the relation between the percentage of sawdust in the mixture and the weight per cubic foot of the material when burned.

The ultimate compressive resistances graphically given in Fig. 2 and the ultimate resistance to shearing in Fig. 3 were obtained from a great number of tests made by I. M. Woolsen, E.M., of Columbia University.

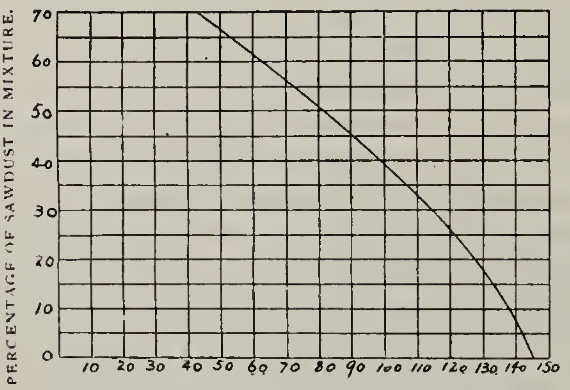


FIG. 1 POUNDS PER CUBIC FOOT OF BURNT MIXTURE.

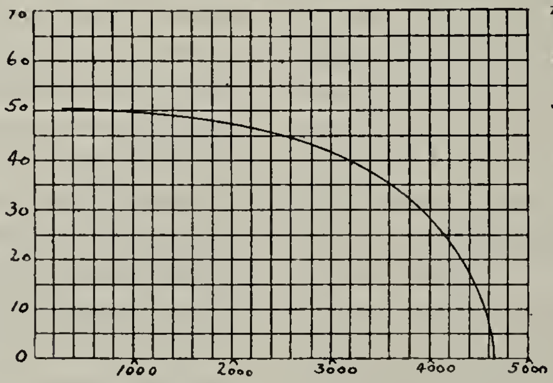


FIG. 2. ULTIMATE RESISTANCE TO COMPRESSION IN POUNDS PER SQUARE INCH

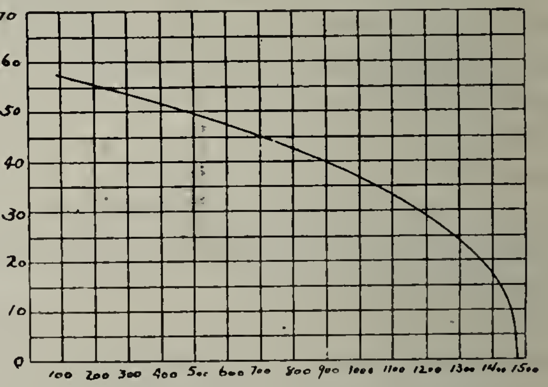
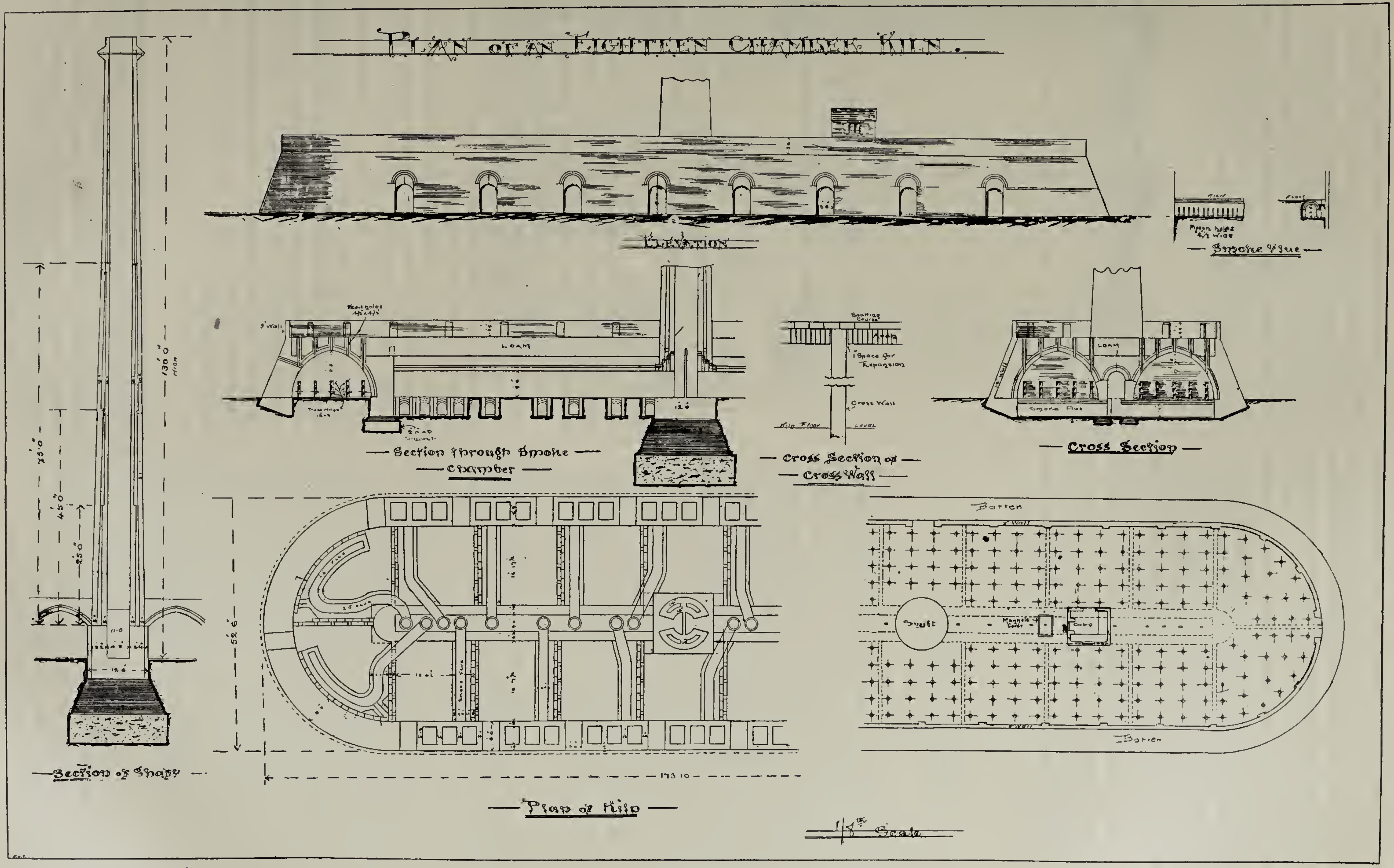


FIG. 3. ULTIMATE RESISTANCE TO SHEARING IN POUNDS PER SQUARE INCH

BRICKMAKING AT PETERBOROUGH.

The district of Peterborough is second to none in the Kingdom for turning out bricks by the semi-dry system. The deposit of Oxford clay, which is the brick-earth of the district, is to be found several square miles in area to the north, north-west, and north-east of Peterborough. To the south of Peterborough will be found the works of the London Brick Co., Hicks, Gardener & Co., New Peterborough Co., Fletton Crown Co. and Messrs. Beeby Bros., and on the north the Star Brick Co. and Northam Brick Co., and on the east Itters Works, Saxon Brick Co., Whittlesea Central Co. and Messrs. Bundy. The clay on the north and east of Peterborough contains less plastic clay on the top, and is, in the opinion of some, superior to that found on the south for brickmaking as it does not require so much dry clay to put it through the grinding pans. The clay (or knots) is dug in a way peculiar to the district. The men employed in the knot hole dig the clay in such a way as to form a shute at the bottom of the draw so that the wagon can be run up close to the slope of clay and filled by barring the clay into it direct from the slope, thus saving all shovelling. The loaded wagon is then taken to the grinding pan, either by means of an endless chain or otherwise, and tipped alongside the mill and the pan man throws the clay into the mill. In most works it is necessary to use dry clay to facilitate the bulk going through the perforations of the pan quickly. The quantity used varies from $\frac{1}{10}$th to $\frac{1}{20}$th of the whole. The clay is then elevated to the top floor and passes through screens and thence into the hoppers of the machines. The enormous demand for Fletton bricks has stimulated the invention of all classes of machinery to produce quickly large quantities of moulded bricks in all stages of dry-



PLAN OF KILN USED AT PETERBOROUGH.

ness. Those with moulds into which the clay is forced are of course the machines best adapted to deal with the Fletton clay and are therefore most extensively used. Some of the machines turn out from 18,000 to 20,000 per day, while others only make about 5,500 per day. Directly the bricks leave the machines they are taken off by boys and loaded into Crowding barrows and taken direct to the kilns without any drying whatever, which is a great saving over the ordinary plastic made bricks. The bricks are set in the kilns on edge in various ways, the most preferable is, after forming the arch, the upper bench bricks are set nick over nick about quarter of an inch apart, which allows for the steam to escape to chimney freely. The accompanying plan is that of a kiln most in favour in the district. The chambers are generally 18 in number and are divided by walls with 5 trace holes in each. These kilns are very successful and economical to work, the Fletton clay containing shale oil and lignite, which allows of the bricks being burnt with very little fuel.

A NEW DRYER.

THE economical drying of bricks is one of the most elusive problems which confront the clayworker. The solutions arrived at up to the present time are many and various, but none can be said to be universal in their application, and for this reason every new departure is to be looked upon as an addition to our knowledge and to our equipment. An invention patented this year in England by a brick manufacturer in Holland presents a variation on a recent new departure in Germany, which is said to be attended with marked success. The German inventor is Keller, who is already well known in that country in connection with other methods of drying. The Dutch patentee is Leo Nefkens, of Blerick, near Vendo, Holland.

The illustrations here reproduced are from the specification of Nefkens's patent. They will serve at the same time to illustrate Keller's invention, which differs only in one detail.

It is a drying tunnel on the "stationary" system, in which goods to be dried are introduced into the chamber filling it completely before the heat is applied. When full the chamber is closed, heat is applied and the goods completely dried before any are removed.

Here we have (Fig. 1) tunnels *a* with perforated floors *b* and heating pipes *c* under the floor, heated preferably by steam.

The special feature of the invention is shewn more clearly in Figs. 1*a* and 1*b*, and is the series of fine perforations *f* in a brick or plaster ridge provided along the highest part of the tunnel roof. These are to allow of the diffusion of the air which carries the moisture dried out of the bricks into the open air without at the same time admitting cold air from the exterior. The construction of the roof generally is calculated to be non-conducting as well as weatherproof, but we do not see the value of the padding of "peat litter or the like" marked *g*. If one tunnel is full and warm and the next one empty and cold, surely the padding is required throughout the dividing wall, and not only at the top.

A small space can be observed over the perforations *f* between the boards forming the roof, and through this the moisture escapes into the air as indicated by the arrows. Where the roof is shewn provided with double boarding, the cavity *i* is to be filled with "tar or other material" for insulation.

It is extremely difficult to see in what way the fine perforations would be more efficient in preventing the admission of cold air than the simple slit between the boards itself. Air must of necessity be allowed to enter over the heating pipes below the floor, and the maintenance of a reasonable temperature within the tunnel would cause a continual flow of hot moist air from inside to outside through any small openings in the roof which were sheltered from rain and snow.

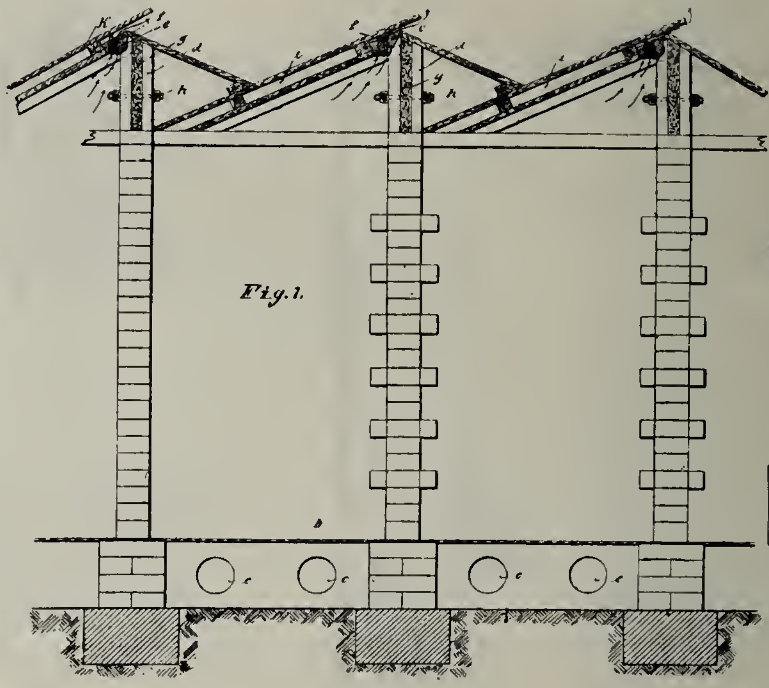


Fig. 1.

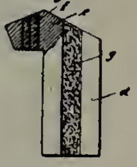


Fig. 1a.

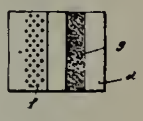


Fig. 1b.

In Keller's invention a similar effect is obtained by the use of straw in the roof where the space is shewn, a thick layer of thatch taking the place of the space *i* and the board beneath it. A similar narrow slit is left at the ridge line *f*, allowing the escape of moisture. The straw probably acts in exactly the same way as the perforations *f*, but Keller makes the special claim that it has a virtue peculiar to itself of allowing the passage of moisture, while preventing the passage of heat.

Processes such as these need careful testing before one can pronounce authoritatively upon them, but the advantages claimed for them appear to be based on the prevailing fallacy that heat can be used over and over again for drying, provided only that the moisture can be got rid of. It is quite true that part of the heat can be recovered by condensing the vapour or moisture back into water, but these appliances cannot pretend to effect this, and their only claim to superiority over others is probably that they are more efficient as non-conductors, and do not allow much heat to be wasted by radiation and conduction. There are reasons further why the stationary system of drying in closed chambers is not to be recommended except in special isolated cases, but we have not space at present to go into them, and they will probably be dealt with in detail in the course of the series of articles on "Brick Drying" now appearing in this Journal.

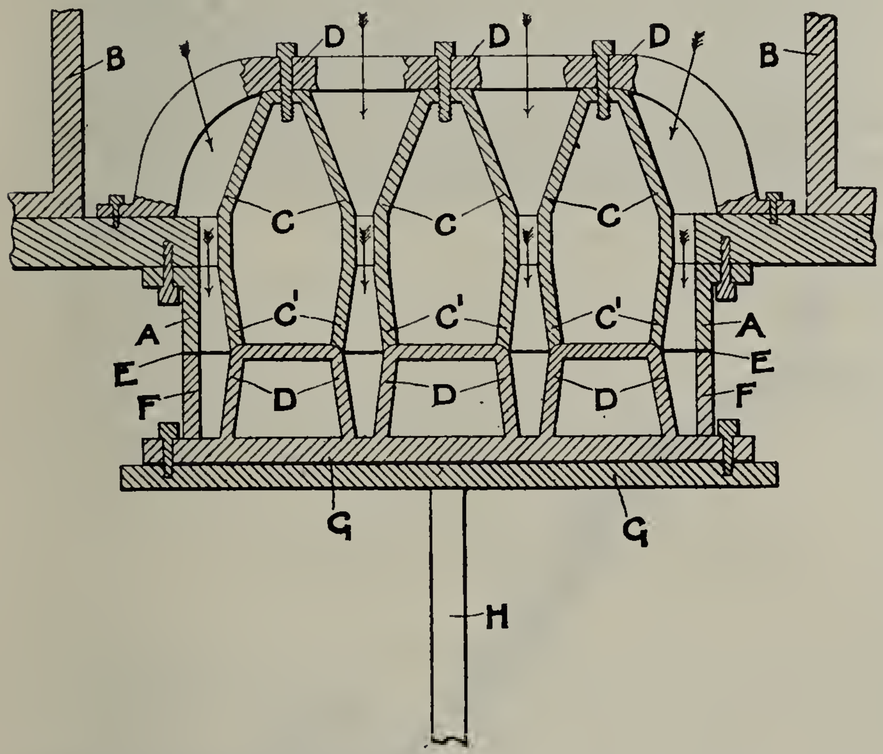
Mutual Insurance.—The British Clayworkers' Mutual Insurance Corporation, Ltd., was started in order to protect brickmakers from the excessive charges of the established offices. On this ground alone it should ENSURE THE SUPPORT OF EVERY CLAYWORKER, but more so because it can do its business at the least possible cost, at the same time giving ample security. Write for particulars to 43, Essex Street, W.C.

IMPROVEMENTS IN MACHINES FOR MAKING BRICKS & TILES.

"The object of this invention is to make a glazed brick, tile, or the like, as light in weight as possible, and so that it can be burnt in an oven or kiln of about the same temperature as that used for burning sanitary goods, and also dispense with the pressing now usually resorted to, my invention being more particularly adapted for making glazed bricks."

Our excuse for quoting in full the opening paragraph of a patent just obtained by Mr. B. Robinson, of Church Gresley, is that we are anxious to demonstrate the inefficiency of the methods of discrimination of our English Patent Office. In Germany or the United States, such a statement of the aim of an invention would be sufficient to elicit at once a series of objections.

Such a skeletonised glazed brick as this machine would produce would never serve its purpose. It would be wanting in strength and could not be bedded. Made in a sufficiently plastic condition to pass through the die shown, the clay would not shrink evenly or retain a sufficiently smooth surface to give a good glazed face. Again, the *temperature* of firing is practically uninfluenced by the thickness of the material to be fired, and depends only on the fusibility of the glaze employed



We reproduce the drawing which accompanies the specification by way of additional protest against both the Patent laws of this country and the invention; B is the mouthpiece of a vertical pipe-making machine, A the die, CC the perforating lugs supported by a cross-bar D; G is a table supported by the rod H, and carrying the half-mould F; E is the line of junction of the half-mould with the die, and D are lugs to mould the perforations of the lower half of the brick.

The table G being held in place, the stream of clay is pressed in the direction of the arrows into the half-mould. It is then allowed to descend, followed by the column of clay, which is cut by a wire at the requisite place.

The initiated will see at once that a line would inevitably show itself on the brick at the point E, if it were ever possible to pull the brick out of the half-mould F without deformation.

That there is crying need of reform in the Patent laws is strongly evidenced by such a grant as this. Our Patent Office grants anything, and without any evident investigation into the merits of an application, leaving the buying public and the inventor to fight out the matter for themselves.

In Germany and the United States matters are conducted differently, and thorough enquiry and search are made before a patent is granted. The inventor is even called upon to give personal explanation of his processes, and to revise his description and re-state his claims again and again before the authorities will acknowledge that they are satisfied as to the novelty and practicability of his invention.

QUERIES AND REPLIES.

Lime Pebbles.—*Can you tell me how best to treat these, which occur from* 10 *to* 20 *per cent. in my clay? Is it necessary to add a disintegrator to the brick-machinery? I enclose specimen ground to a very fine powder.*—Constant Reader.

Your difficulty is a great one, and it is not easy to advise you as to what is best to be done. If the limestone pebbles are of any size they could no doubt be got rid of by washing the clay. If that were undesirable or impracticable, and the lumps were large, a considerable proportion could, no doubt, be eliminated by hand-picking—two or three nimble boys being employed for the purpose. You will know best as to how far your profits will permit of the establishment of further machinery. We should have thought that with only from 10 to 20 per cent. of pebbles, and especially limestone, the crushing rolls could have performed the work quite well. We presume they are really good ones, and that the clay is not passed by too rapidly. The sample sent is very fine, the question is whether it is not too fine—whether more work has not been put into it than is necessary for wire-cuts. Make the rolls do their work better, and then see what happens.

Non-porous Bricks.—*Referring to note in last issue of the "British Clayworker"* re *non-porous bricks* (p. lxxiii. *ante*), *can you give me any further information on the subject? What conditions are the bricks to fulfil? Is the demand for them likely to be large?*—Colchester.

In reply to the above, the only information we can give, is that if our correspondent has an absolutely non-porous brick, the best thing he can do is to make the fact widely known amongst waterworks' engineers in the country. It is hardly possible that he can have that, for if the brick were really non-porous it is difficult to see how it can have been properly burnt to the core. However, we take it that comparative porosity is the factor aimed at, and it behoves manufacturers, therefore, to have the brick properly tested in reference to that point—and there are very few people in the United Kingdom who seem to know the method of ascertaining porosity. It is not sufficient for the maker to say that his bricks are non-porous, his view must be backed up by independent evidence. The second query has been answered partly in connection with the first. But, we may add, that bricks for waterworks purposes are wanted principally in the construction of reservoirs and culverts. Their surfaces should not be too smooth, so as to take the cement easily, and to make a secure mass of brickwork. For reservoirs, however, the bricks are used mainly for lining purposes, and it was that that the writer of the "note" referred to had in his mind when writing it. In reply to third query—there is an increasing demand for bricks for waterworks purposes in almost all parts of the country.

NON-POROUS BRICKS (2).—*In the notes by F.R.I.B.A., you have an article headed "Wanted, Non-porous Bricks." Will you kindly send me the address of the proper person to write to about this, as I happen to know of the very brick for thepurpose, and can be guaranteed to hold boiling Nitric Aci dif required, and, moreover, if the cement joints would stand, I do not think it possible to force water through them?*—H.

See reply above on the same subject; your best plan would be to introduce these bricks to the notice of the waterworks engineers. Get a list of the Members of the Association of Waterworks Engineers to begin with.

FIRE-CLAY.—*Is there any probability of the fire-clay, of which the undermentioned is a chemical analysis, being of any value for manufacturing fire-bricks, glazed bricks, sanitary ware, or any other saleable goods?*—YORKS.

Silica	64·10
Alumina	19·70
Potash and Soda	2·10
Lime	·62
Magnesia	2·00
Iron oxide	3·86
Water and organic matter	7·00

We are of opinion that the material (called fire-clay) referred to in the above analysis is of no use whatever in the manufacture of fire-bricks. It contains too much potash and soda, magnesia and iron. The nearer fire-clay approaches a true silicate of alumina, the better, and iron ought not to be present except in exceedingly small quantities. It is always difficult to tell from the mere chemical analysis as to how far a material may be suitable for the other clay goods mentioned, but there is little probability of its being of much use for sanitary ware, and we are not particularly struck by its applicability for the manufacture of any but the lower grades of clay goods.

BRICKBURNING NUISANCE.—*Can you kindly tell me if the Local Authority has power to prevent my manufacturing bricks?*

No, it has no power to prevent you starting a brickfield, but you have no right to bring a nuisance to your neighbour, and *having* started the yard, an injunction might obtain, under certain conditions, on the nuisance being proved by the affected person. So far as the authorities are concerned, brickmaking is not scheduled as an offensive trade.

The clay I work consists of about 40 *per cent. silica,* 40 *per cent. alumina, and* 10 *per cent. iron. Do you think this would make buff quarries?*—W.

You have not given us much information to go upon, and the analysis you quote is lacking in regard to 10 per cent. of its constituents. The other figures seem to be rather an estimate than a record of carefully ascertained facts—and without these latter, nobody could give you a reply worth having, in such a case as this. If you will kindly send us further particulars which may enable us to fill in these gaps, we will try again to solve the problem.

LANDSLIPS AND FLOODS.

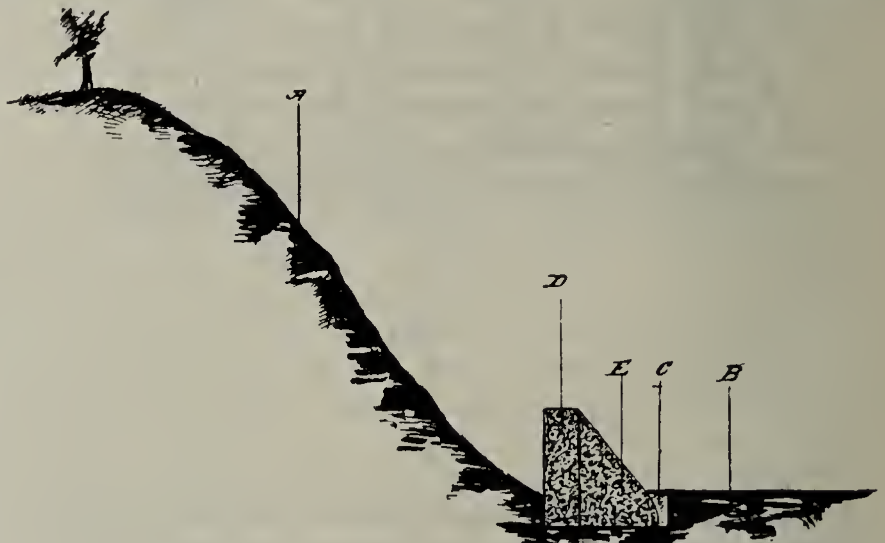
MR. GEO. T. DURANT, of Northampton, sends us some interesting experiences relative to recent landslips and floods in brickfields. We are sorry we have not room to quote the whole of his letter, but the following are some extracts from it:—

"Travelling in the Peterborough and low-lying districts adjoining during the last two weeks in February was really a marvellous panorama, miles upon miles of land being under water. One new works had been set out and erected in the Nene Valley, and for weeks had had only one approach by a circuitous route of five miles. A neighbouring yard to this had thrown up temporary entrenchments to dam out the rising water, and from all appearances another nine inches, or one severe rain, and the whole works would have been deluged to a depth of from two to three feet.

The moral is: in putting down a brick-yard keep out of dips and valleys, let the machine house be the highest point, the loading-away wharf the lowest, and work your material from a bank, or preferably from a hill, if possible.

In dealing with slips—where you are working a forty or sixty-foot face of clay-earth, careful and proper civil engineering modes and methods must be adopted. Assuming that an unbearing or overburden bank is slowly encroaching, slipping, and gradually spreading over your clay-hole bottom, drastic measures should be taken for thoroughly and efficiently dealing with the moving mass.

I find but few manufacturers have a thorough knowledge of the value of their own waste products. Concrete made of bag lime and broken bricks is one of them, and one which can be applied to withhold probable or happened slips. Perhaps my sketch will show the plan:—



A is the slipping bank. *B* the solid clay-hole bottom. *C* shows a trench running the length of the bank *A*, a few feet from the edge of slip, and 3 or 4 feet wide by 4 or 5 feet deep. *D* is a wall of strong concrete 6 or 7 feet high, according to the height and angle of the moving bank to be withheld. *E* are the withholding or sustaining walls, also of concrete, 2 feet thick, and set every three yards or so the whole length.

The photograph shows a method of moving an immense volume of water.

A direct-acting steam pump was employed 150 feet from a boiler, with a delivery lift of nearly 200 feet, and a capacity of

about 2,000 gallons per hour. The whole was planned, erected, and started within thirteen working hours by two fitters and two labourers, under personal supervision of course.

The ordinary pump and drain were powerless, necessitating lifting and taking the whole water away across neighbouring fields."

LITERATURE RECEIVED.

Laxton's Builders' Price Book, 1900. Kelly & Co. — We have received a copy of this excellent annual, without which no brickmaker's office library can be considered complete. The book is very exact in its information, and the work has been brought up to date. It further gives important decisions under the New London Building Act, tried in the Appeal and other Courts. In respect of decisions, we think the book might be made more useful than it is, if a brief epitome of cases tried in the Appeal Courts, under the Workmen's Compensation Act, as affecting builders were given. The two recent cases tried, in which an "undertaker" was clearly defined, and another in which it was held that a man must have been engaged for at least a fortnight by a firm before he can make a claim in case of accident, are instances of important readings of the Workmen's Compensation Act which could not have been anticipated. Perhaps another year we may see this addition made.

We have also received a most excellently got up "blotter" from Messrs. Mordaunt Lawson & Co., of Workington; a calendar from Mr. F. H. Warden, of Leeds; a capital barometer from the Vulcan Boiler and General Insurance Co., Ltd., Manchester; and catalogues from Messrs. Cresswell's Asbestos Co., Ltd., Bradford.

THE SEPARATION OF STONES FROM CLAY.

To the Editor of "The British Clayworker."

Dear Sir,—I am obliged for your correction of figures, but the fact still remains, that your estimate for the cost of water was exactly half the price that we pay for it. That others get it cheaper or for nothing, does not help us or those similarly situated.

We have over 50 per cent. of stones, and we pay one shilling per 1,000 gallons for our water, and our machine does away with both, therefore it is valuable to us.

Those who have few stones and cheap water are to be envied however.

Your statement that clay if dried on a kiln or shed *does* cost money to dry, as the space occupied by it might be employed in drying bricks, does not hold good with us, as we are able to dry all the bricks we manufacture, in tunnels heated by the waste heat from our boiler and kiln flues. We have the top of our kiln and shed therefore free for drying clay.

You say that if it is only necessary to treat mechanically half the clay used, it would only be necessary to wash half the clay.

What we require is, that one half of our clay be *dust dry*. I do not see how washing half of it will give this result. If we washed half of our clay, we would require to dry it to enable us to put the other half direct from the pit through our machines, and as the washed clay would contain probably 80 per cent. or more of moisture, that would be a much more costly thing than drying the clay direct from the pit as we do, and having probably not more than from 12 to 20 per cent. of moisture.

Yours truly,

Mar. 8th, 1900. Robt. A. Rossborough.

[We insert Mr. Rossborough's letter with which to close the correspondence, and would only point out that we treated the Patent from the point of general utility, and not as it affected Mr. Rossborough.]

THE WORKMEN'S COMPENSATION ACT, 1897.

IMPORTANT RULING IN THE APPEAL COURT.

No Claim unless Employee has been working at least two Weeks.

Sysons *v.* Andrew Knowles and Sons (Limited). This was an appeal by the employers from an award of the Judge of the County Court of Lancashire, in an arbitration under the Workmen's Compensation Act, 1897. The employers were the owners of a colliery near Manchester. The applicant, who was a pitman, went into their employment as a piece worker at wages of 6s. a day on Tuesday, July 18th, 1899. He went into the pit and did a day's work. On the next day, Wednesday, there was a holiday at the pit, and the applicant did not go to work. On Thursday he went to do another day's work, and while he was at work he was injured by the fall of a piece of coal. On Friday, July 21st, he was paid 6s. for the work which he did on the Tuesday, and on Friday, July 28th, he was paid 6s. for the work which he did on the Thursday. The colliery week ended on Tuesday evening. The question was, what was the right way of calculating the applicant's "average weekly earnings" under section 1 (*b*) of the first schedule to the Workmen's Compensation Act. The County Court Judge thought that, as the applicant had earned 12s. within seven days, his average weekly earnings were that sum, and he made an award for a weekly payment of half that sum—viz., 6s. By section 1 of the schedule "the amount of compensation under this Act shall be (*b*) where total or partial incapacity for work results from the injury a weekly payment during the incapacity after the second week not exceeding 50 per cent. of his average weekly earnings during the previous 12 months, if he has been so long employed, but if not then for any less period during which he has been in the employment of the same employer, such weekly payment not to exceed £1."

Mr. F. H. Mellor appeared for the employers in support of the appeal, and argued that the applicant did not come within the Act, on the ground that the Act did not afford any machinery by which compensation could be awarded to him. It was impossible to ascertain the average weekly earnings of a man who had only worked for two days.

Mr. Joseph Walton, Q.C., and Mr. Postlethwaite, for the applicant, argued that the Act was not confined to men who were engaged by the week. The words were a "payment not exceeding 50 per cent. of his average weekly earnings." Section 1 of the Act gave the right to compensation, and these words in the schedule merely fixed a limit. The word "average" only applied where there was anything to average; if there was not, then the *maximum* sum, which was not to be exceeded, was the sum which the man had actually earned.

The Court allowed the appeal.

Lord Justice A. L. Smith said this appeal raised a question of great importance, which was simply this—whether a workman came within the purview of the Workmen's Compensation Act, who, having entered into an employment and gone to work, was injured on the first day of his employment. In this case the workman had worked for two days, but the question was the same whether the man worked on two days or only on one day. The facts were that the applicant went into the masters' employment on Tuesday, July 18th, 1899, and did a day's work. On Wednesday the pit was not at work, and the applicant did not go there at all. On Thursday he went into the pit to do a day's work, and while he was at work on that day he was injured. Was he within the Act? It was asked on behalf of the applicant, "Why should he not be within the Act?" His Lordship could not answer that question; his duty was to consider whether, on the true construction of the words used by the Legislature, the applicant was within the Act. They had already held that upon the words of the statute a painter painting the outside of a house on a ladder was not within the Act, though a builder under the same circumstances would be within it; though why the one was included and the other excluded he could not say. The words which they now had to consider were very important words—viz., the words in Schedule I. which regulated the payment of compensation. His Lordship read sub-sections (*a*) and (*b*), and said the question was whether they embraced the case of a man who had only been at work a day, or whether they contemplated that the man should have been at work for such a time that his weekly earnings might be averaged. Mr. Walton's argument cut the word "average" out of the schedule. In his opinion the court was driven to say that, in order to come within the Act, a man must have been at the time of the accident in his employment for at least two weeks. If he had not been in employment for two weeks, it was impossible to give any meaning to the words "average weekly earnings."

Lord Justice Collins was of the same opinion. It seemed to him to be impossible to give any decision on this Act which should be logical and free from anomalies. The Legislature had not brought every workman within the Act, and they could not speculate on the reasons why certain classes had been left out. He thought that the schedule, reading it in its natural sense, contemplated that the relation of master and servant should have existed for not less than two weeks.

Lord Justice Romer said he felt great doubt as to this case, but he did not differ from his learned brethren.

WHAT IS AN "UNDERTAKER."

Important Ruling.

The case of Mason *v.* A. R. Dean, Limited, Moore and Sons, third parties, was recently brought before the Court of Appeal from the County Court of Lancashire. The applicant was the widow of Frederick William Mason, who had been killed in the course of his employment by a fall from a scaffold. His employers were A. R. Dean, Limited, furnishers and decorators, of Birmingham. The accident happened on February 10th, 1899, at the Lyceum Theatre, Eccles, near Manchester. The theatre was then an incomplete building, exceeding 30ft. in height, and it was being constructed by means of a scaffolding. Messrs. Moore and Sons had, prior to the date of the accident, contracted with the building owner for the construction of the building and for the erection of the scaffolding from which the deceased man fell. Under powers reserved in Messrs. Moore and Sons' contract the architect let off to Messrs. Dean certain decorative work. The scaffolding used by the deceased and his fellow-workmen was erected by Messrs. Moore and Sons at the expense of the building owner. At the time of the accident the deceased man was painting the ceiling of the theatre, and while walking on the scaffolding one of the planks gave way and he fell to the pit floor and was instantly killed. The respondents denied liability on the ground that the employment of the deceased was not an employment to which the Workmen's Compensation Act applied; and they also alleged that Messrs. Moore and Sons or their workmen erected the defective scaffolding, and were the persons responsible for the scaffolding. The respondents delivered to Messrs. Moore and Sons a notice of claim to indemnity against all liability on account of any accident caused by the scaffolding. At the hearing of the arbitration, before the arbitrator appointed by the County Court judge, it was contended on behalf of the applicant that the respondents were undertakers within the meaning of section 7, sub-section 2, of the Workmen's Compensation Act, and that they were engaged on work of construction in a building exceeding 30ft. in height, and then being constructed by means of a scaffolding. It was contended on the part of the respondents that the work which they had contracted to do was not work of construction within the meaning of the Act, and that they were not undertakers within the meaning of the Act. The arbitrator held that the respondents were undertakers, and that they were engaged in the construction of a building exceeding 30ft. in height, such building being then in course of construction by means of a scaffolding, and he awarded the applicant the sum of £300, with costs. At the request of the respondents the arbitrator stated a case for the opinion of the County Court judge, submitting the following questions:—(1) Whether the respondents were undertakers in the construction of a building within the meaning of the Act; (2) whether the Workmen's Compensation Act applied to the employment in the course of which Mason was killed. The County Court judge set aside the award of the arbitrator with costs, on the ground that, though the respondents were undertakers engaged in the construction of a building within the Act, yet the case of Wood *v.* Walsh and Sons (1899, 1 Q.B., 1,009) showed that painting the ceiling of the theatre was not an employment within the Act. The applicant appealed and the Court allowed the appeal.

Lord Justice A. L. Smith said that in his opinion the respondents were liable in this case. The Workmen's Compensation Act only applied to certain classes of employers, as shown by section 7, sub-section 1. Did it apply to the respondents? It applied to "employment by the undertakers, as hereinafter defined, on, in, or about any building which exceeds 30ft. in height and is either being constructed or repaired by means of a scaffolding or being demolished." Here the building was not completed. The respondents were put on to do certain work which would help to bring it to completion. The contract of the respondents with the building owner showed that the work they had to do included the putting up of a ceiling, the erection of a proscenium, and the fixing of private boxes with columns, caps, &c. No doubt a good deal of the work was decoration pure and simple.

But there was ample to show that they had also to perform structural work. The building was over 30ft. high, and it was being constructed by means of a scaffolding. It was clear that the deceased man was employed on a building within the Act. Was he employed by undertakers within the meaning of the Act? By sub-section 2 of section 7, "undertakers" meant in the case of a building the persons undertaking the construction, repair, or demolition. Ought that to be construed as meaning the persons undertaking the construction of the whole building or did it also include the persons undertaking the construction of a substantial part of a building? In his opinion a person who undertook the construction of a substantial part of a building was an undertaker within the Act. He therefore thought that the judgment of the County Court judge was wrong, and that the applicant was entitled to the compensation which had been awarded to her by the arbitrator.

Lord Justice Collins was of the same opinion.

Lord Justice Romer agreed. He thought that where a building was being constructed by several persons, not jointly, but each doing a separate part, each and all of them came within the definition of "undertakers" in section 7. But only that undertaker was liable to pay compensation in whose employment the workman was at the time of the accident.

The Court refused to allow the costs of the third parties.

THE LAW.

The Normanby Brick Co., Limited.—Reduction of Capital.—In the Chancery Division of the High Court of Justice on February 24th Mr. Justice Cozens Hardy had before him a petition by this company asking the sanction of the Court to resolutions which had been passed for reducing the capital of the company. Counsel, in support of the petition, stated that the company was formed in 1897 to carry on business as brick and tile manufacturers at Normanby, near Middlesbrough, with a capital of £55,000, divided into 11,000 shares of £5 each. The company took over a going concern, but shortly after the formation extensions were started, and an action was started by the lessor of the land for an injunction to restrain the company from building. This had ended adversely to the company. Mr. Justice Cozens Hardy made an order reducing the capital of the company from £55,000 to £11,000, divided into 11,000 shares of £1 each.

Are Blaes a Mineral?—The assessor of the County of Stirling appealed recently against a decision of the Valuation Committee expunging from the valuation roll an entry referring to the brick-works at Dunipace of Stein & Co., brickmasters, Bonnybridge, which the assessor had assessed at £200 per annum. The respondents Stein & Co. in 1896 leased from William Baird & Co. (Limited), coal and iron masters, Glasgow, a certain piece of ground at Dunipace at a rent of £50, or otherwise in the option of the proprietors a royalty of three halfpence per ton of goods manufactured from the very large heap of blaes which occupies all or the greater part of the land leased. The respondents erected kilns, ovens, and other apparatus for grinding, moulding and baking the blaes, and turning the same out in the form of bricks. The respondents were assessed as tenants on the £50 stipulated as rent in the lease, and in addition they were entered separately as proprietors and occupiers of the brick-works erected by them, the annual value being stated at £200. The lordship paid to William Baird & Co. (Limited), which amounted to £123, was entered in the roll of 1899-1900 as the value of the subjects let. The committee held that the erections assessed at £200 fell within the exception provided by sub-section 3 of section 4 of the Lands Valuation (Scotland) Amendment Act, 1895, in respect that they were structures in which minerals—the blaes—were treated, and that the rent or lordship payable by them under the lease was calculated upon the minerals so treated—the finished product in the shape of bricks. The assessor's contention was that the material treated in the structures was not a mineral within the meaning of the Act; that the exception was intended to apply not to a substance such as blaes, for which, after lying waste for many years, a use had at length been discovered, but to the case of valuable material substances, excavated, brought to the surface, and forthwith treated, as in the typical instance of coal being taken direct from the pithead to the coking oven.

The Assessment of Kilns, &c.—Before giving judgment in the preceding case, the Court decided to hear an appeal of the Cleghorn Terra-Cotta Company (Limited), 144, West Regent Street, Glasgow, against the assessor's valuation of their works at Cleghorn entered in the valuation roll at £600. In December, 1896, the appellants became tenants under a lease for 31 years of the red clay, surface clay, raw limestone, screened coal, coal dross, and gas coal lying in and under certain parts of the lands of Cleghorn, Lanark. The only mineral which had been wrought under the lease was red clay, and for this a lordship had been wholly paid on the manufactured article—6 2-8d. per ton of terra-cotta bricks made. In 1899 the lordship was £137 5s. The appellants have erected various buildings and kilns on the ground leased by them, and the assessor valued these erections at £600, and the Valuation Committee approved of the entry. The appellants maintained that these erections fell under the exceptions of sub-section 3 of section 4 of the Lands Valuation Amendment Act, 1895, as they were used for the treatment of minerals. In the blaes case, Lord Stormonth Darling said the process carried on in the structures could not be described otherwise than as the treatment of minerals, and he did not know that a more convenient term could be selected. His opinion was that the structures fell within the purview of the sub-section. Lord Kyllachy concurred, and the appeal was dismissed. The next case, Lord Stormonth Darling said, seemed to him to be ruled by their decision in the last case. The committee here had taken a different view of the law, and therefore the judgment of the Court must be that the committee were wrong in the conclusions to which they had come, and that the Cleghorn Terra-Cotta Company could only appear in the valuation roll for the sum of £137 5s., which was the admitted amount of the royalty paid. Lord Kyllachy concurred, and the appeal was sustained.

Prosecution under the Factory Act.—Under the provisions of the Factory Act, the Crowborough Brick Works Company have been summoned at the instance of Mr. Le Neve Foster, one of her Majesty's Inspectors of Factories, in respect of certain breaches of the said Act. The Inspector prosecuted, and Mr. W. C. Cripps, solicitor, appeared for the defendants.—In the first case against the Company, it was explained that the responsible owners of the Factory, which is situated at Crowborough in the parish of Rotherfield, had failed to keep the provisions of the Act of 1878 by permitting certain parts of the mill gearing of the machinery not to be securely fenced, nor to be in such a position, or of such construction, as to be equally safe to every person employed at the brick factory.—On behalf of the defendants, Mr. Cripps pleaded guilty, but at the same time contended that for eight years the factory had been worked as at present without complaint, and there had been no prosecution of the Company, and no objections raised by visiting inspectors. But the Company had no wish to avoid the provisions of the Act, or to avoid doing anything which might be needful for the protection of the workmen.—Mr. Cripps, in reply to some remarks by the Inspector, said the "notices" had been posted up at the works, inside, and the Act did not state specifically where such notices were to be posted. In fact some parts of the Act were misleading.—The Inspector reminded the Bench of the full penalty for the omissions named, but the Bench fined the Company £3 and 8s. costs in the first case.—A like fine, with costs, were inflicted for not having a fly-wheel connected with steam power securely fenced, at the same works.—The third point in the summons was that an offence had been committed by the defendants against the Metalliferous Mines Regulation Act, of 1872, by neglecting to post up an abstract of the said Act.—Mr. Cripps pointed out that such a "notice" was posted up in the building.—The Bench, in this case only inflicted a fine of £1 and 8s. costs.—The last summons against the Company was—"for permitting certain dangerous parts of the machinery in the said factory not to be securely fenced at the same time and place."—A fine of £3 and 8s. costs in this instance was inflicted by the Magistrates, who were assured by Mr. Cripps that the Company would not fail to fully carry out the provisions of the Acts.

An Engine Dispute.—Robey & Co., Ltd., *v.* John G. Stein & Co. Judgment was given by Lord Low on the 9th inst. in an action in which Rober & Co., Ltd., engineers, Lincoln, sued Messrs. J. G. Stein & Co., fire-clay works, Bonnybridge, Stirling, for £955 7s. 7d., said to be the price due in connection with a horizontal condensing engine supplied by the pursuers to the defenders. It was contended for the defenders, who declined to make payment of the sum sued for, that in giving the order for the engine they had relied on the pursuers' representations and guarantees as to the great saving which one of their engines would effect in fuel consumption; and they said that they had suffered very serious loss in consequence of the pursuers' failure to fulfil their guarantee relative to the fuel consumpt—a loss which amounted to a sum not less than that sued for. The pursuers, in answer to these statements, said that estimates of their Glasgow representative furnished to the defenders at the time when the contract was entered into proceeded on certain assumptions the correctness of which could not be verified, and which had nothing to do with the efficiency or economy in working their engines. They said that a guarantee of fuel apart from steam consumption was never given, as that depended on the nature of the fuel used and the description and condition of the boilers. Lord Low, after reviewing the correspondence that had passed between the parties at the time the contract was entered into, said he had come to the conclusion that there was no warranty, that the pursuers were accordingly not in breach of warranty, and that the defenders were liable for payment of the price of the engine.

An Illegal Distress.—The hearing of the action in which George Hodson, of Blyth Bridge, Stoke-on-Trent, was the plaintiff, and Thomas William Belfield the defendant, was resumed at the Stafford Assizes on March 9th. The plaintiff sought to recover damages for an illegal distress levied by the defendant upon the Fine Oak Brickworks at Blyth Bridge, of which the plaintiff was tenant. Mr. Plumptre appeared for the plaintiff, and Mr. B. C. Brough for the defendant. The plaintiff became the tenant of the brickworks, of which the defendant was owner, in January, 1899, and agreed to pay rent from the date on which he began to manufacture bricks. Under the tenancy agreement, the plaintiff alleged, the defendant authorised him to repair the boiler at the works and deduct the cost from the first quarter's rent, which came to about £26. The cost of the repairs was £20 18s. 3d. The plaintiff began to manufacture bricks on February 13th, 1899, and the first quarter's rent was due on May 13th following. In June plaintiff sent in his bill for £20 18s. 3d. and on August 3rd, paid £5, which, he said, was the balance of the first quarter's rent. On August 4th the defendant put in a distress for two quarters' rent, less £5 paid on account. The plaintiff contended that the first quarter's rent had been paid, and the second quarter was not due until August 13th. Within three days of the date of levying the distress defendant sold part of the plaintiff's bricks by private treaty. The bailiffs were in possession of the brickworks for twenty days, and then the remainder of the plaintiff's goods were sold by auction. The plaintiff's credit was injured by the action of the defendant, his goods were sold for less than their value, he was obliged to give up his business and take a situation as manager to another firm, and he also had to dispose of an option he had under the tenancy agreement to purchase the brickworks for £2,000.—In cross-examination yesterday Hodson admitted that in November he brought an action, tried at Henley County Court, to recover the £20 18s. 3d., the cost of repairing the boiler at the brickworks. He recovered the full amount. He also admitted that prior to August 3rd, he had sold bricks at less than their proper price because he required money. Owing to some differences between his partner and himself, the plaintiff had some difficulty in carrying on the brickworks in July. At the same time, about August 2nd or 3rd, he had promised to pay to the defendant £25, but he could not tell why he had made the promise. The defendant had not before levying the distress pressed him for payment of rent.—For the defence it was contended that the distraint was legal. The plaintiff began to manufacture bricks on February 2nd, and consequently two quarters' rent was due on August 2nd. Plaintiff did not pay any rent, although repeatedly asked for it, until August 3rd, when he paid £5 on account.—After hearing part of the evidence the Judge said there was really no defence to the action, and suggested that counsel should confer with a view to arriving at an agreement as to the amount of the damages.—Eventually counsel agreed to judgment for the plaintiff for £40.

COMPANIES' MEETINGS.

Stanley Brothers Limited.—The report of the directors for 1899 states that the profits continue to show an increase upon previous years, the net profit being £14,523, after allowing £3,433 for depreciation. The directors recommend a further dividend on the preference shares at the rate of 6 per cent. per annum and a dividend on the ordinary shares at the rate of 14 per cent. per annum, making a total of 10 per cent. for the year, leaving £8,215 to be carried forward. As further capital is required for the purpose of developing the collieries and brickworks, it is proposed to increase the nominal capital of the company to £210,000 by the creation of 5,000 new shares of £10 each, of which it is proposed that 2,500 shall be preference shares, ranking *pari passu* with the existing preference shares, and the remaining 2,500 shall be ordinary shares, but the directors only propose to issue £25,000 at present, one-half in preference and the other half in ordinary shares, at a premium of 10s. each on the preference and of 25s. each on the ordinary shares.

Lunesdale District Brick and Tile Company.—The third ordinary general meeting of the shareholders was held on February 22nd at the offices, Lancaster, to receive the report of the directors and statement of accounts, as well as for the election of directors and auditors. Mr. John Hatch, J.P., presided, and there was a fair attendance of directors and shareholders. The directors report stated that the net profit for the year amounted to £3,230 4s. 7d., which it was proposed to distribute as follows:—Payment of dividend at the rate of 7½ per cent. per annum, £2,250; reserve account, £500; and balance carried forward, £480 4s. 7d. The sum of £76 18s. 6d. has been written off for depreciation, and £50 has been added to bad debt reserve account. The report and statement of accounts were presented and adopted and a dividend of 7½ per cent. declared. The retiring directors, Mr. William Wright and Mr. H. H. Holmes (Lancaster), were re-elected, and Mr. James Todd, chartered accountant, Preston, was re-appointed auditor. A donation of £5 5s. was voted to the Royal Lancaster Infirmary. A vote of thanks to the chairman for presiding concluded the meeting.

NEW COMPANIES.

Acme Brick Company, Limited.—Capital £3,005 in £1 shares, to carry on the business of brick, tile, and cement manufacturers, etc. Table A mainly applies.

Great Yarmouth Brick and Tile Company, Limited.—Capital £1,000 in £1 shares, with objects as indicated by the title. Registered without articles of association.

Charles Wood, Limited.—Capital £5,000 in £1 shares. To acquire and take over as a going concern the business now carried on by Charles Wood, at Cargo Fleet, Middlesbrough, and to carry on the business of engineers, brick, tile and cement manufacturers, &c. The number of directors is not to be less than two nor more than five. The first are—Charles Wood and John S. Thorp (managing director). Registered office, Tees Railway and Engineering Works, Marsh Road, Cargo Fleet, Middlesbrough-on-Tees.

Malkin Tile Works Company, Limited.—Capital £25,000 in £10 shares. To adopt an agreement between E. Malkin & S. Malkin and H. Wood, to acquire the business carried on at Newport Lane, Burslem, and to carry on the business of china and earthenware manufacturers, and manufacturers of and dealers in pottery of any description. The first directors (to number not less than two nor more than three) are: S. Malkin, H. Wood and J. Cope. Qualification, £50. Remuneration of S. Malkin, £832 per annum; others, as fixed by the company.

Ford-Green Brick, Pipe and Road-Metal Company, Limited.—Capital £1,000 in £1 shares, to acquire the business now carried on by J. W. Dean, at Ford-Green, Norton-in-the-Moors, Staffordshire, to adopt an agreement with the vendor, and to carry on the business of manufacturers of and dealers in bricks, tiles, drain and other pipes, pottery, terra-cotta, &c. The directors are to number not more than three; William Deane is the first. Qualification, one share. Registered office, Bellington Lane, Ford Green, near Stoke-on-Trent, Staffordshire.

Aston Junction Company, Limited.—Capital £10,000 in £10 shares, to adopt an agreement with S. W. Wheatly, E. Sharp, and E. A. Sharp, for the acquisition of the business carried on at 39, Aston Road, Birmingham, as the Aston Junction Lime, Brick, and Coal Company. The first directors (to number not less than three nor more than five) are S. W. Wheatly, J. A. Tomlinson, and E. Sharp. Qualification, 50 shares. Remuneration as fixed by the company (maximum £50 each per annum). Registered office, 39, Aston Road, Birmingham.

Moxey, Savon & Co., Limited (64,703).—Capital £100,000, in £100 shares, to carry on the business of coal merchants, workers of and dealers in brick-earth, fireclay, and other minerals. The number of directors is to be four. The first are John E. Moxey, Joseph L. A. Savon (chairman), Ernest R. Moxey, and Marius A. Savon, all permanent. John E. Moxey and Ernest R. Moxey are the managers in London and Cardiff respectively. Remuneration of John E. Moxey, £1,700; of Ernest R. Moxey, £800; of Joseph L. A. Savon, £1,000; and of other directors £500 each per annum.

The Wouldham Cement Company (1900).—To acquire the business of Portland cement manufacturers which has been carried on for over 25 years at the Lion Works, West Thurrock, Grays, on the River Thames. Capital £250,000, divided into 10,000 6 per cent. cumulative preference shares of £10 each and 150,000 ordinary shares of £1 each. The whole of the ordinary shares will be taken by the vendors in part payment of the purchase-money of £410,000. The present issue is at par of £200,000 perpetual 1st mortgage 4½ per cent. debenture stock and 10,000 of preference shares.

John Sadler & Sons, Limited.—Capital £10,000 in £5 shares. To acquire the business carried on by John Sadler at the Shidas Lane Brickworks, Oldbury. The number of directors is not to be less than three nor more than five. The first are: John Sadler (chairman), Philip John Sadler (managing director), and Edward Pincher. Qualification, 10 shares. Remuneration of John Sadler, £150 per annum; of Philip J. Sadler, £208 per annum, residence and 5 per cent. of the net profits.

Anglo-Belgian China Clay Co., Limited.—Capital £15,000 in £1 shares. To acquire certain concessions granted to Mr. Merckens for getting and working kaolin or china-clay and sand on and under lands situate at St. Gerard, Belgium. The directors (to be not less than three nor more than seven) are H. A. Northey, A. E. Young, Major J. R. Scott, F. Haeck, and G. T. G. Merckens. Qualification, 250 shares. Remuneration, £200 per annum, divisible.

Park Field Brick, Pipe and Stone Company, Limited.—Capital £10,000 in £1 shares. To adopt an agreement with Benjamin Turney, to acquire lands and property in Yorkshire or elsewhere, and to carry on the business of manufacturers of bricks, tiles, pipes, &c. The number of directors is not to be less than three nor more than seven; the first are—Thomas Pickles, William Sutcliffe, and Robert Woodhead. Qualification, £250; remuneration as fixed by the company. Registered office, 22, Barum Top, Halifax.

Grove & Co., Limited.—Capital £7,500 in £10 shares, to acquire the business now carried on under the style or firm of Grove & Co., to adopt an agreement with C. Wedgwood, F. H. Wedgwood, K. L. Wedgwood, and J. Shufflebotham, and to carry on the business of potters and brick and tile makers, etc. The first directors (to number not less than three nor more than five) are C. Wedgwood, F. H. Wedgwood, K. L. Wedgwood, and J. Shufflebotham, each of whom may retain office so long as he holds £250 shares. Remuneration as fixed by the Company.

TRADE NOTES.

Fatal Accident at Faversham.—A patent kiln collapsed at some red-brick works at Faversham on February 22nd, killing one man and injuring three others.

Death of a Lancashire Brickmaker.—The death is announced of Mr. Ralph Platt, of Southport, at the age of eighty-one. He was a brickmaker who, it has been estimated, supplied over two hundred million bricks to Southport.

Pyrojim.—An Irish newspaper announces the invention of a new cheap fuel known as "pyrojim," which is constructed out of the contents of the dustbin, ground together and mixed up with oil and charcoal, and then moulded into bricks.

Messrs. Thomas W. Dance and Sons, coalowners and fire-brick manufacturers, of Newcastle, have taken into partnership Mr. Joseph Hunter, who has been associated with them for the last twelve years. The business will in future be carried on under the name and title of Thomas W. Dance, Son and Hunter.

Customs Decision.—The Board of Trade has received, through the Foreign Office, a copy of the following decision of the United States Treasury Department in respect to tiles. Articles 7½in. by 8in. by 1¼in., not embossed, enamelled, painted, nor ornamented in any way, and known commercially as "Quarry tiles," are dutiable at 4 cents per square foot, under paragraph 88 of the Tariff, and not as bricks, under paragraph 87.

Brickmaking in Australia.—The various brickmaking yards in Hawthorn, Australia, are now very busy, a large amount of building going on throughout the district. In addition to this Messrs. Spear and Co. have secured the contract for the bricks required in constructing the Collingwood railway line, amounting to about 1,500,000, at £1 15s. 6d. per 1,000, and in consequence have been able to take on extra hands. So buoyant is the industry at the present time that many of the brickmakers who left for West Australia and South Africa during the depression have been written to, and are returning to take up their old positions.

The Corporation of Lincoln have resolved, if possible, to make the largest and deepest boring for water in the United Kingdom. It will be over 2,000ft. deep and not less than 12in. diameter at the bottom. The proposed deep boring will, it is expected, secure about a million gallons per day of pure water from the new red sandstone beds, which at Lincoln are nearly 1,400ft. below the surface.

Arlesey Brick Co., Limited.—The employés of the Arlesey Brick Co., Limited, were invited by Mr. T. M. Howsen to a supper on March 1st. Some 170 were present, also some of the G.N.R. staff and retired old hands of the firm. After supper Mr. Howsen proposed the health of the Queen, and subsequently addressed the company on the prospects of brighter trade in the future. Owing to the war and the weather the outlook was dismal. After four or five years' prosperous times, they must look for a slack time, but he could only say after carefully watching the trade they were in for a brighter future.

The Strand Improvement.—The work of demolition of the Strand block, which stands between St. Clement Danes and St. Mary-le-Strand, has begun. The whole of the Holywell Street block in not coming down, but only the southern half of it—that is to say, the houses on the northern side of the Strand. The removal of the whole block is not to be expected for a long time yet. It will not be begun until the operations for the construction of the great new street from Holborn to the Strand are entered upon; and for this work Parliament allows the County Council seven years, with another three years for "works." There are about thirty houses to come down now, including those which have two numbers, and they stretch some 500 feet from end to end. Some are old and some have been reconstructed; when they have been removed, four public-houses will disappear, and the "Spotted Dog," the "White Hart," the "Norfolk Arms," and the "Eagle and Sun," will grace the Strand no more. An area of 16,000 square feet will be cleared. In order to understand the extent of the improvement effected it is necessary to remember that at the present time the width of the Strand between the two ends of the block is sometimes only 40 feet and is never 50 feet. More than 20 feet of roadway will, therefore, be added for the horses, and there is to be a pavement of reasonable width for the passer-by. At present the houses left standing in Holywell Street will be boarded up on the Strand side.

Portland Cement in Holland.—Regulations concerning Portland cement now in force in Holland are as follows:—The cement must not leave more than 10 per cent. on a sieve of 900 meshes per square centimetre (5,800 per square inch). The setting, which should take at least two hours, is tested by filling an ebonite ring 40 centimetres high with the mortar, to which is then applied a needle one square millimetre (·0015 sq. in.) in section loaded with a weight of 300 grammes (10½ oz.); the setting is held to commence when this rod fails to penetrate to the bottom of the mortar, and to finish when it fails to indent the surface. The test for constancy of volume is performed by placing a cake of cement on glass and protecting it from drying for 24 hours, when it should be found neither to have cracked nor changed its shape. The tensile tests are made on blocks of at least 5 square centimetres (·775 sq. in.) section, and the specimens are prepared with one part by weight of cement, one part by weight of normal sand, and from 0·3 to 0·4 part of water. The mortar is made and stored for 24 hours in a moist atmosphere and immersed for 27 days in water; it must then show a tensile strength of at least 227 lb. per square inch. Compression tests made with the same mixture, the blocks being 2in. cubes, should fail at a load equal to not less than 2,275 lb. per square inch. With a 7-day test, the tensile strength should be 142 lb. and the crushing load 1,422 lb. per square inch. Specimens of neat cement are required to show a tensile strength in a 7-day test of 355 lb. per square inch, and in a 28-day test of 498 lb. per square inch.

A Lawyer on Workmen's Compensation.—A meeting of the Solicitors' Managing Clerks' Association was held on February 15th, in the Middle Temple Hall, London, when Mr. Ruegg, Q.C., delivered a lecture on "Workmen's Compensation." The lecturer invited the consideration of his audience to the whole subject of which the Workmen's Compensation Act, 1897, was but the latest development—namely, the growth and present position of the law imposing responsibility on employers of labour to make compensation to their workmen for accidents happening in the course of the employment. He showed that the view entertained fifty years ago of the obligation of employers towards employed had completely changed. The principle was now assented to, not only that it was just that the employer should be responsible for injury caused by fellow workmen, but also that he should pay compensation for every accident arising in the execution of his work, whether occasioned by negligence or not, and even generally where caused by the injured workman himself. The lecturer said it did not accord with his views, either of sound sense or justice, that the employer should be compelled to pay compensation for accidents in cases where he had been in no sense in default, where the occurrence could not have been foreseen or prevented, and could not be attributed directly or indirectly to his negligence, merely because the injury was sustained by the workman whilst doing his work. Still, this was the effect of this Act. That it was unpalatable to many employers was not to be wondered at. So far as he was aware, it was never agitated for by the working men of the country, nor formed an item in the trade unions' programmes. The learned gentleman went on to speak of the many erratic decisions by County Court juries when dealing with cases under the Act of 1880. He had seen £125 given for injury to a little finger, while £25 had been awarded for the loss of a right leg. He suggested that it would serve a useful purpose if a County Court Judge were given power to invest money awarded as damages, or to pay it in instalments—a system which found favour in both Germany and Austria. Dealing with the Compensation Act passed by the present Government, Mr. Ruegg remarked that it was based on the German system, although by no means identical with it. The German law grouped the different trades, making them a sort of mutual insurance company. It was unpalatable to many employers, and so far as he was aware it was not agitated for by workmen of trades-unions. As a matter of fact, the provisons were too novel to this country to be applied to trades beyond those regarded as dangerous. Dealing with the anomalies of the Act, the lecturer pointed out that if a carman fell off his load in the factory yard, and was killed, his dependants would be entitled to compensation; yet if he was killed in a similar way some distance off, no compensation could be recovered. Again, before a workman engaged on a building could recover the structure must be 30ft. high. He was of opinion that, although the Act had been attacked—perhaps justly as to the absurdity of some of its provisions—yet the complaint that it would occasion much litigation was not deserved. Up to the present there had been one hundred appeals, and the number was not excessive considering that it was a new Act, founded upon untried principles, and that many industries were necessarily on the border line between those included in the Act and those excluded. In Germany the appeals in the High Court averaged 10,000 a year. He was convinced that sooner or later the Act would be extended, so as to include all industries. After giving instances of the difficulties met with in interpreting the Act, the lecturer said he wished to emphasise the statement that the incongruities to which he had drawn attention were in no way due to the statute having been construed in a a forced or erratic manner. They had, in his opinion, resulted from applying to the actual wording of the statute the general and only safe canon of construction, namely, that the intention of the Legislature must be gathered by giving the usual and ordinary signification to the words used, apart from any consideration as to what well might have been or should have been intended.

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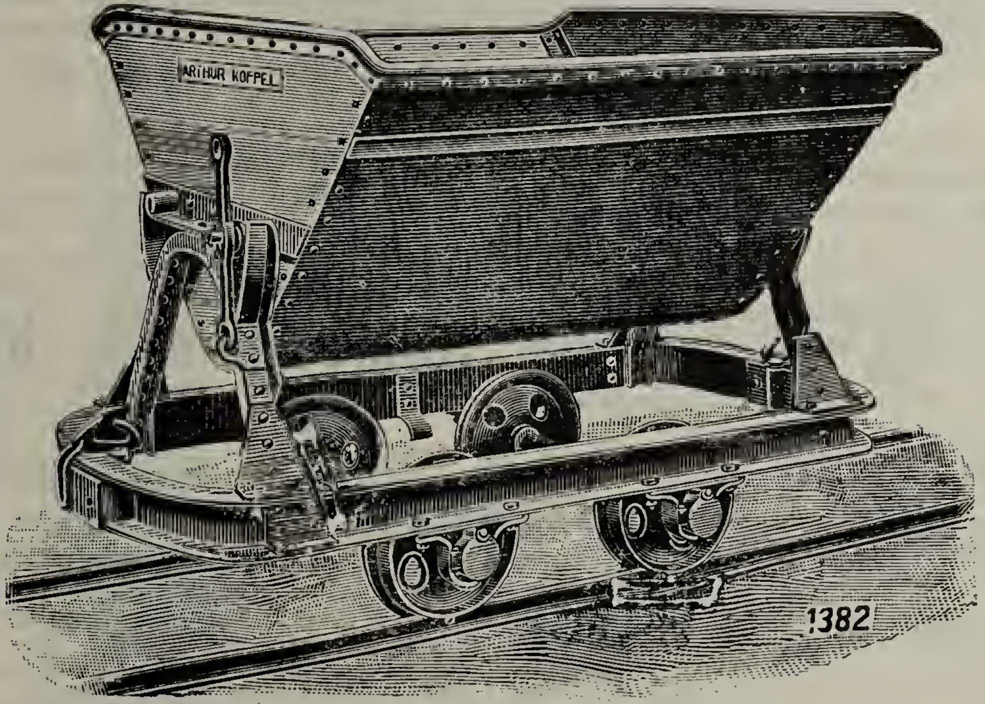

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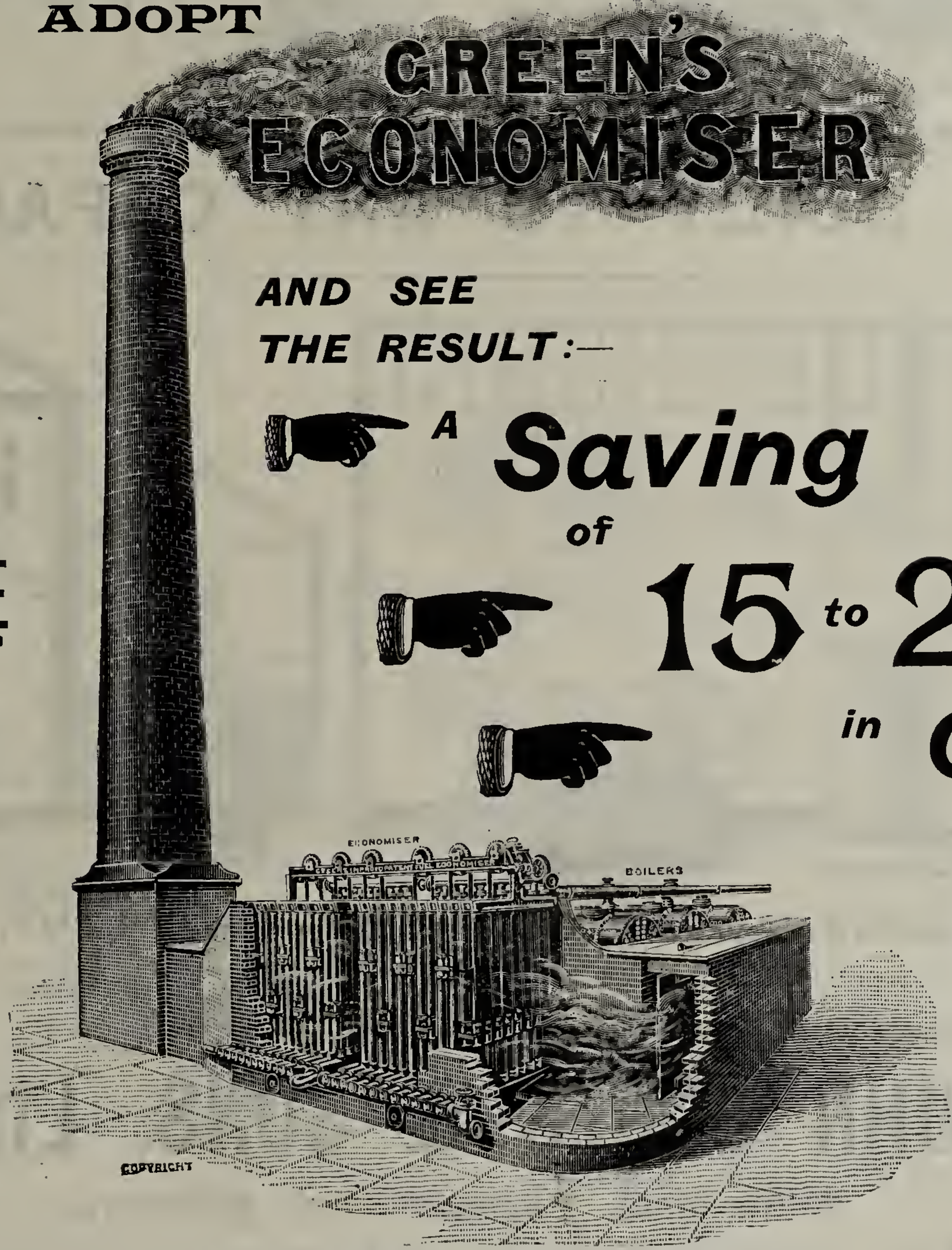

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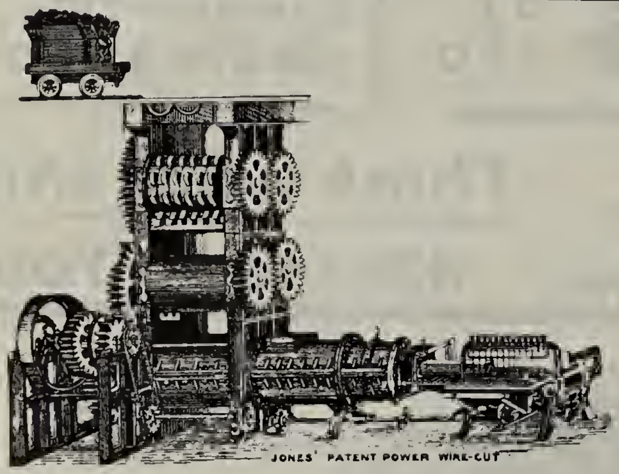

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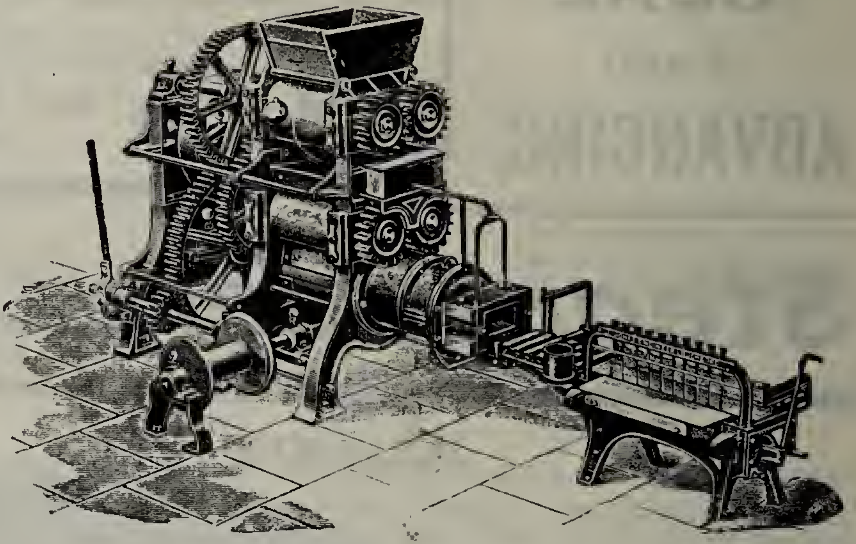

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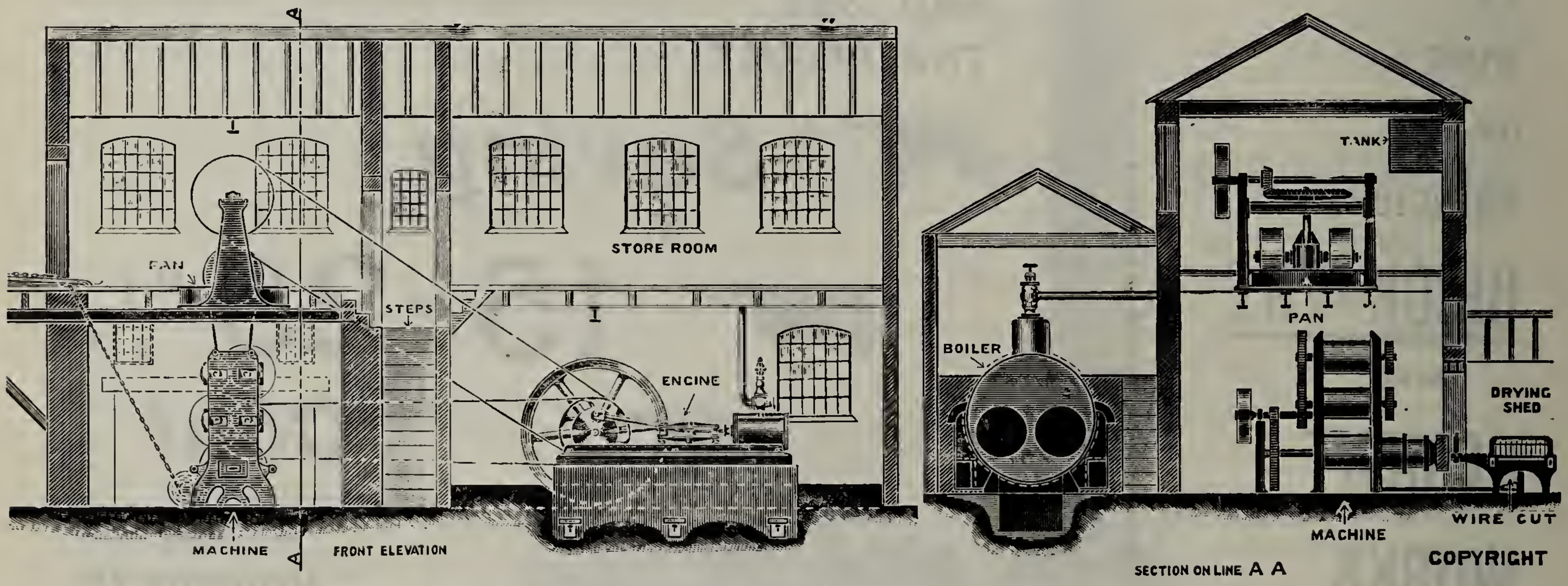

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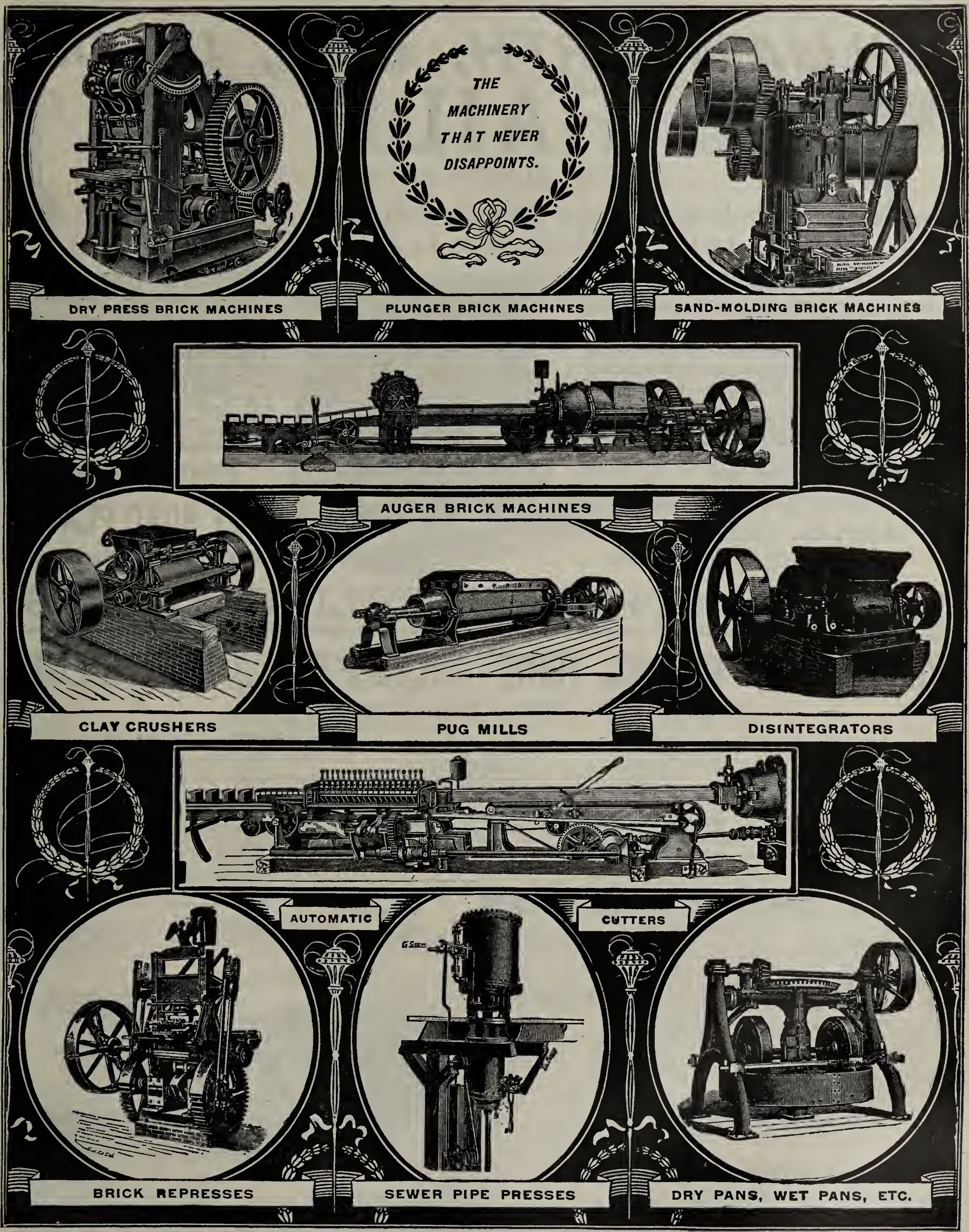

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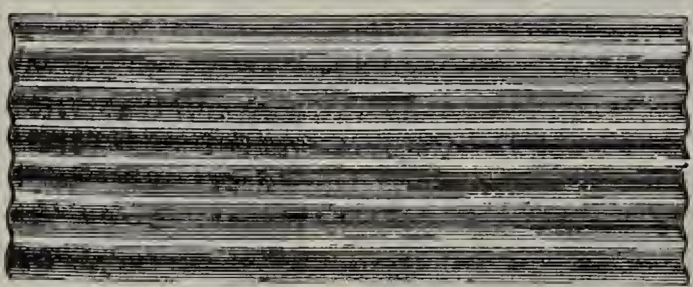

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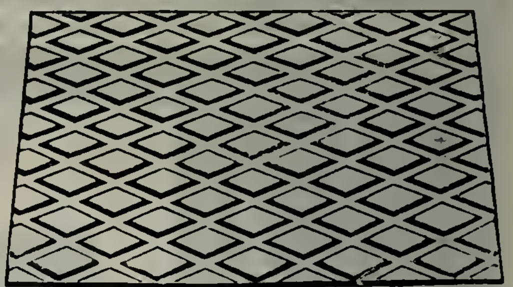

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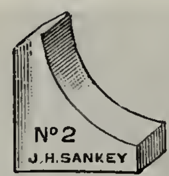

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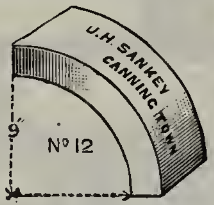

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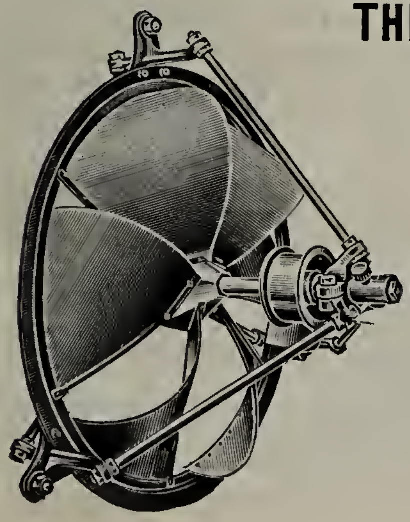

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One STONE-BREAKER, by W. Johnson, practically new; size of jaws, 12in. by 8in.
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1 Eight H.P. Vertical Steam Engine.
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48 PORTABLE ENGINES, from $2\frac{1}{2}$ h.p. to 30 h.p.
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Thousands of tons of Machinery of every description.
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MR. H. R. VAUGHAN, Brickworks' Engineer, Patentee of Improved Steam Drying Sheds, The X.L. All Continuous Burning Kiln, Brick Dies, &c., having had 25 years' practical experience in Machine Brickmaking, is open to ADVISE on most suitable Machinery and Plant, and to Prepare Plans for the best modern and complete Plants of any size, adapted for all kinds of Clay.—Address, H. R. Vaughan, Lagan Vale Brickworks, Belfast.

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BRICK MANUFACTURER, who has had 18 years' experience, is open to negotiate with a man of capital or owner of land suitable for Brickworks, neighbourhood of London preferred, with a view to PARTNERSHIP. Advertiser has up-to-date Plant, capable of turning out 100,000 Plastic Bricks per week minimum.—Apply No. 10,278, *British Cayworker.*

SITUATIONS VACANT.

MR. HORRIS PARKS, of SOUTH NORWOOD, wishes to state that he has had so many applications for the positions advertised in last number that he has been unable to reply to them all individually, and whilst thanking them he begs to say the appointments are now filled.

WANTED, a FOREMAN for a Large WIRE-CUT BRICKYARD in the Midlands. Must be able to supervise bricklayers, and repairs to house property.—Reply stating Age, Qualifications, and Salary required to "Bristol," *British Clayworker* Office.

WANTED, a Steady, Reliable and Practical FOREMAN, must have thorough knowledge of red sand, brick and clamp stock burning and must be good manager of men.—Apply "Bricks," c/o this Journal.

BURNER WANTED, good man for small yard, must be accustomed to open-topped kilns; references required.—Apply Box 107, c/o this Journal.

WANTED, steady, Reliable FOREMAN for Country Brickyard, must be good burner and used to wire-cut machine.—Apply, stating references and wages required, "A.C.," office of this Paper.

BRICK BURNER REQUIRED, accustomed to burn wire-cut and machine-pressed bricks in Hoffmann and 'Perfect' Kilns: output 70,000 per week; must be prepared to contract, taking full responsibility for turning out bricks properly burnt.—Apply with full particulars, "Ainsworth," Central Chambers, Swindon.

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WANTED, competent and experienced MAN to undertake Making and Burning Bricks by CONTRACT; large Wire-cut Machine, Continuous Kiln, modern plant, near London.—"C. W." *British Clayworker*, 43, Essex Street, Strand, W.C.

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BRICKWORKS MANAGER. — WANTED, an EXPERIENCED PERSON, well up in making Wire-cut, and Pressed Red and White Bricks. Constant employment for a thoroughly trustworthy person; an abstainer preferred.—Apply "National," c/o *British Clayworker.*

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BRICKMAKING FOREMAN desires SITUATION, Salary or Contract. Experienced in Clamp Stocks, Red Facings, Up-draught Kilns, Stoney Clays and Marls; good references.—Apply "S. & R.," *British Clayworker.*

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BRICK and TILE WORKS.—Experienced MANAGER wishes situation; 20 years' practical experience in agricultural drain pipes and tiles, also Red Brick wire-cut; understands machinery; testimonials and references.—Address "G. D." c/o *British Clayworker*, 43, Essex Street, Strand.

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TO BRICKMASTERS.—ADVERTISER (Scotchman), is open for engagement as MANAGER or MANAGING FOREMAN. Thorough knowledge of Wire-cut and Semi-Plastic Machinery, also Continuous and other Kilns; capable of laying-out Yard and superintending erection of Machinery.—Apply in first instance to "Thistle," c/o *British Clayworker*, 43, Essex Street, Strand.

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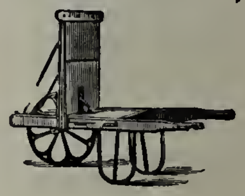

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PRACTICAL MEN state it to be the only Continuous Kiln which has been known to turn out really High-class Goods, superior to any Down-draught Kiln (see Testimonials below).

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This kiln effects an economy in fuel of from 50 to 80 per cent. on any ordinary up and down-draught kiln. Our system insures perfect combustion, as may be seen from entire absence of smoke from chimney.

By using one of our "MANCHESTER" Kilns an Annual Saving of from £800 to £1,000 may be effected in the Cost of Fuel alone on a weekly output of 110,000.

TESTIMONIALS.

THE REDHILL BANK BRICKWORKS, ROCESTER, STAFFS, *May 27th*, 1899.

DEAR SIRS,—We have great pleasure in bearing testimony to the satisfactory working of the "Manchester Kiln" for the time we have had it in use, which is about nine months. The saving in fuel, as against the ordinary down-draught kiln, is a wonderful item. The goods come out a deal better in colour, and I may say are giving great satisfaction to our customers everywhere they go. In my opinion there is no better kiln working at the present day.

Yours truly,
A. HEWINS.

Messrs. DEAN, HETHERINGTON & Co.

BRICK & DRAIN PIPE MANUFACTURERS, ANSLOW, NEAR BURTON-ON-TRENT, *Sept. 29th*, 1899.

DEAR SIRS,—I am glad to tell you that your Kiln is giving me perfect satisfaction in every way.

Yours truly, HARRISON & CO.

Messrs. DEAN, HETHERINGTON & Co.

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DEAR SIRS,—In reply to your inquiry, I have now had 4 years' practical experience of your kiln, and am fully convinced it has no equal. I made close on two million bricks and pipes last year, and my waste from all sources would not exceed 6,000. I have had a life's experience with different kilns, and have carefully examined different patents, but I find none equal to yours. The Hot-air and Steam System in your Kiln is perfection. The Kiln is very easy to manage and turns out a splendid article. I can with confidence recommend the "Manchester" to anyone requiring a Continuous Kiln.

Yours truly, T. JACKSON.

DEAR SIRS,—After 20 years' experience as Brick Burner's Manager, both in England and abroad, I find your "Manchester" Kiln superior to ANY Continuous Kiln I have known, both as regards turning out good bricks, and the small consumption of fuel. I am at present turning out on an average 110,000 bricks per week—consumption of slack 3-cwt. per 1,000.

Yours truly, F. PRENDERGAST, Manager,
Messrs. A. R. BULLIVANT & SONS,
BRICK WORKS, MANCHESTER.

Messrs. DEAN, HETHERINGTON & Co.

Manufacturers contemplating the erection of New Kilns should write for full particulars to the undersigned, who have had 30 years' practical experience in Brickmaking and Burning, and are in a position to thoroughly explain and work their system.

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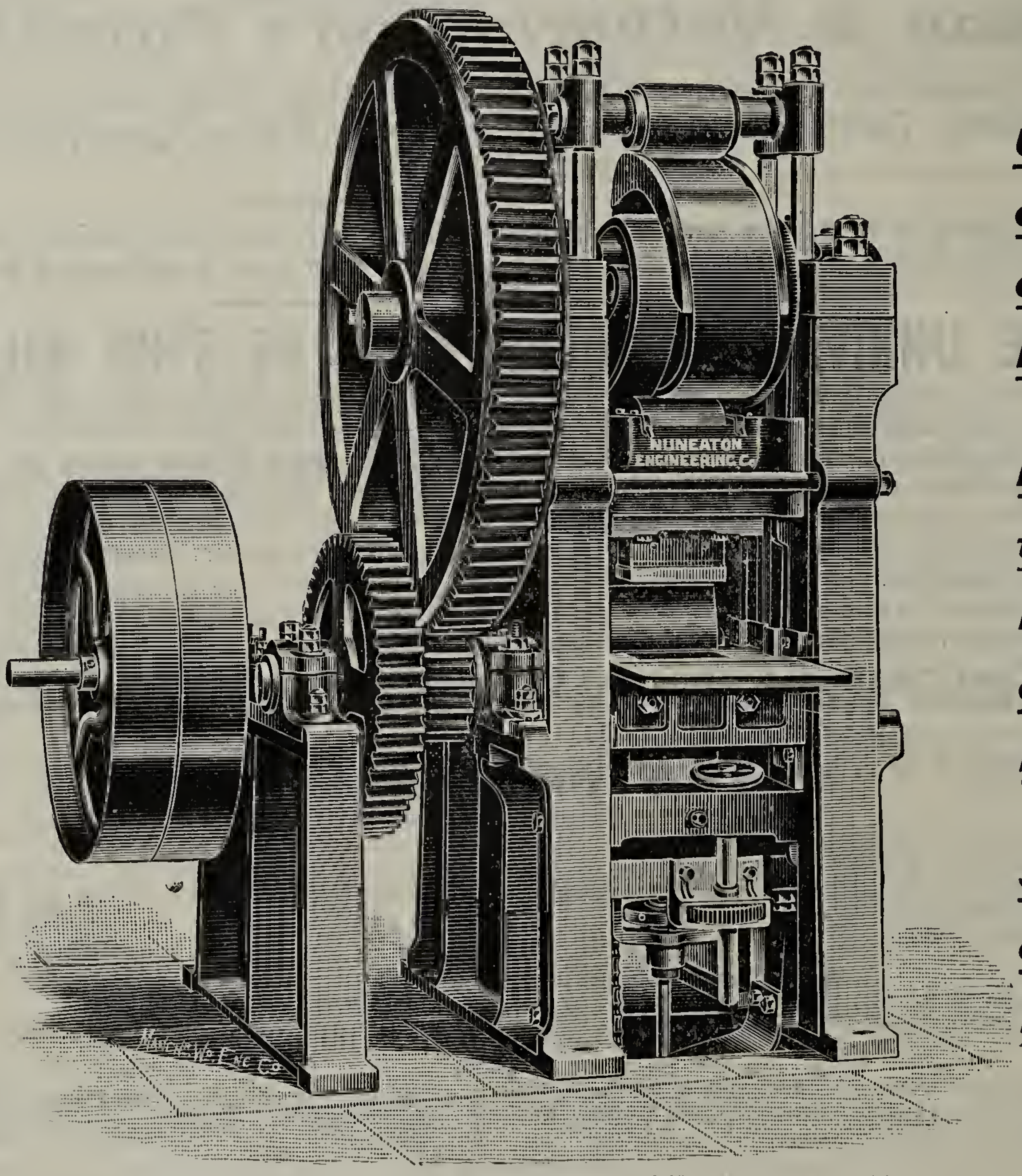

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Also Makers of Clay Grinding Mills, Perforated Grinding Pans, Improved Tile Rolling Machines, Steam Dust Paving Tile Machines, Steam Pipe Machines, Screw Pipe Machines, Steam and Hand Power Presses for Bricks, Copings, Ridges, Roofing and Paving Tiles, &c.; Patent Sink Presses, both Hand and Steam Power; Gulley Trap Machines, and all sorts of Clayworking Machinery.

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Brick manufacturers will do well to see whether their clay is suitable for the semi-dry process of making bricks, by which a very considerable saving in time and cost of production is effected and uniform colour attained. No drying is required. The material can be taken straight from the face, panned, pressed and set into kilns within half an hour. Manufacturers are invited to send samples of their clay for trial.

SUPPLEMENT TO THE BRITISH CLAYWORKER.—APRIL, 1899.

THE BRICKBUILDER.

TERRA-COTTA.*

I DOUBT if at any time when great works were executed it has ever before been open to the architect and the contractor to build in so many different ways, and use such various materials. Consider for a moment what was in use when Westminster Abbey was erected. We find in that building only stone of various sorts, including marble, sand and lime, timber, lead, glass, tiles, and a very sparing use of iron, and no other materials. If we come down to the erection of St. Paul's we find the same materials with the addition of brick and copper. At the present day we have, in addition to these, one entirely new material, namely, Portland cement; one virtually new, namely, steel—never till now available for structural purposes. We have the natural cements, such as Roman cement, &c.; and we have concrete in various stone, artificial stone, sundry metals, and lastly, terra-cotta. These additional materials (save Portland cement) are developments or new applications or revivals of materials already known to the world, and though virtually new to us are not new to the art of building.

Among these revived and developed materials terra-cotta is taking an important place; it is being extensively employed, and this being so, I have thought that it might very suitably form the subject of a lecture.

The name terra-cotta is Italian, and, literally translated, means "burnt earth"—a title which, of course, might include bricks, but the term is always understood as meaning a material made of finer earth than the brickmaker uses, and more thoroughly burnt; a material to be employed in building for decorative purposes, and usually made in blocks larger than bricks, and of a different shape. Terra-cotta is not, however, artificial stone, and it partakes more of the nature of brick than of stone. While stone is wrought with the chisel or the pick from the block in a hard state, terra-cotta is modelled or cast in the plastic clay or earth a soft state, and then dried and fired. Stone, it is true, is used, as is terra-cotta, to finish or ornament a building, but most of the ornaments, mouldings, and features which can be readily cut out of stone with a chisel are different from what can be readily modelled in soft clay, or cast in that material in a mould. There is, accordingly, a proper terra-cotta treatment, and a proper stone treatment, of ornament, and to deal with terra-cotta as if it were artificial stone is not to use the material the best way.

Terra-cotta belongs to the most ancient of the articles man has manufactured. To quote Sir Charles Lyell "burnt bricks, jars, vases—the human figure in burnt clay—are found in the remains of submerged towns, in the channels of the Nile and Upper Egypt, in the Mexican buried cities of America, and elsewhere, as the enduring types of the civilisation of peoples and races whose names even are not known in the pages of history. Granite disintegrates and tumbles into particles of mica, quartz, and felspar. Marble soon moulders into dust of carbonate of lime, but hard, well-burnt clay endures for ever in the ancient landmarks of mankind."

The earliest specimens of terra-cotta that we have—and they are of very great antiquity—were not manufactured for building purposes or for ornament, but for the very dissimilar purpose of writing materials.

The ancient Babylonians, Assyrians, and Egyptians used to prepare tablets of clay, to write on them while soft with a pointed stick, and then to fire them. A tablet such as one can hold in the hand, or a small cylinder, covered with writing, was made to hold a long inscription, and practically indestructible. The famous Tel Amarna letters were tablets of this sort. There are hundreds of these tablets in the British Museum. To many of the most ancient of them is ascribed an antiquity of not less than 3,000 years, and to some even more, and they can be read with ease (by those who know the language) to-day, so indestructible a material is terra-cotta.

The first nations to use terra-cotta for many purposes of ornament (so far as we know) were the Etruscans and the Greeks. The Etruscans were the people who lived in the central part of Italy before the Roman day. The country they occupied extended from Rome to Florence, and they have left behind them the remains of many cities, with cemeteries, and in the tombs of their cemeteries they had the habit of burying jars and ornaments of terra-cotta, some of which were made in the country, while others were brought from Greece. They made large funereal chests, or sarcophagi, of this material. A sarcophagus was a glorified sort of coffin, large enough to contain a corpse, and was intended to bear on the lid a life-sized effigy of the deceased, executed in terra-cotta.

Sarcophagi are represented in the British Museum by two fine specimens, one a little more than 2,000 years old (say 2,100), the other much more antique and singular, and probably at least 400 years older. The points that will interest you most about these curious specimens are the perfect preservation in which they have come down to us, and the singular mastery of a difficult manufacture which had been attained so long ago. I doubt if Lambeth at the present day would find it easy to turn out such large specimens of terra-cotta better or more free from defects.

Before mentioning the subject I shall not speak to you about Greek and Etruscan terra-cotta vases, for they seem to have more relationship to pottery than to building, but there is another manufacture of ancient terra-cotta which I cannot bring myself quite to pass over; I allude to the statues, chiefly, but not always, those miniature statues, which are usually known as statuettes. These seem to have been favourite ornaments of the Greeks and Romans, and of the people influenced in their tastes by Greek civilisation, and they were very frequently placed in tombs, where most of those now in our own and other museums have been found.

These statuettes were CAST in moulds, and many of them are graceful and pleasing to the last degree. You can find hundreds of them at the British Museum, ranging in age from 2,600 years to 1,800, or thereabouts, and still more in Paris. In addition to their great beauty, they illustrate for us the ease with which ornamental work can be reproduced in terra-cotta, and the extraordinary durability of that material under reasonably favourable conditions.

Coming now to that which more nearly interests us, namely, the application of terra-cotta to building, we have in the British Museum an illustration of the striking antiquity of its use, brought, like the great sarcophagus which I have already referred to, from the buried remains of an Etruscan city. It had been understood from classic writers that it was customary in Etruria to erect buildings partly of timber and enrich them with ornaments done in terra-cotta, and consequently specimens of the ornaments so used have been sought for. Some have at last been dug up in Civita Lavinia, near Rome. These are attributed to the sixth century before the Christian era, that is to say are now 2,500 years old, or thereabouts. They are of Greek design, and possibly Greek manufacture. What is shown is part of the side cornice of a building, believed to have been a small Greek temple, with part of the ornamental frieze which crowned the wall. The sloping cornice of a pediment or enriched gable end, and a series of extremely elaborate and striking ornaments known by the Greek name of "antefixæ," which were employed at intervals along the line of eaves. The great beauty of this work will strike the eye, and the capacity of terra-cotta for receiving ornament is illustrated by it.

---

*Being a Lecture delivered by PROFESSOR ROGER SMITH, F.R.I.B A.

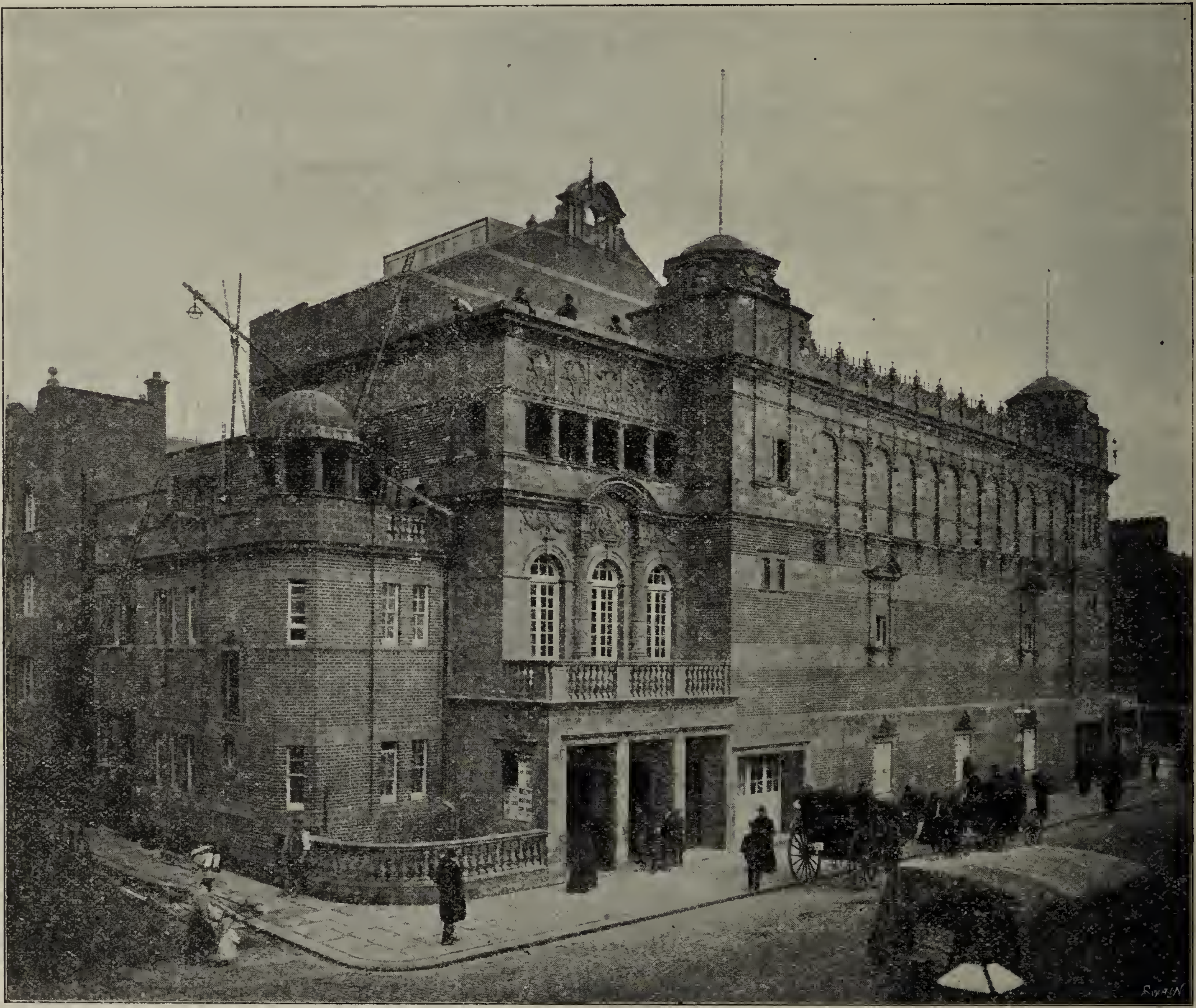
From the same place a series of ornamented slabs have been obtained, which appear to have been fastened by bronze pins to a timber structure, and a considerable number of such slabs have been found at Civita Castellana, the ancient Falerii, an Etruscan site, and are now in a museum at Rome.

The colour of all this terra-cotta is of brownish-cream colour, very similar to the colour of most of the terra-cotta in use in London now. The very fine specimens, such as statuettes and vases are generally paler than the larger pieces, but I do not recollect ever seeing any ancient terra-cotta that is red.

At Civita Castellana remains of the terra-cotta cornice of a building of very similar character to those set up in the British Museum have also been found and taken to Rome, and are described in an Italian archæological publication. Taking these two examples as illustrating one another, it seems clear that the terra-cotta was secured to a simple, timber-framed structure with a span roof having a gable at each end. The roof was covered with large flat tiles of terra-cotta with a flange at each edge. Each joint was covered by a large terra-cotta roll. The underside of some of the tiles was painted for a few inches, indicating by how much they had overhung at the eaves. At the end of each of the rolls just alluded to was a large and rich ornament known as an antefixa. This rose about 18 in. above the eaves. It was fixed at right angles to the plane of the roof, and consequently sloping a little forwards. The ornament was held in place by a stout terra-cotta strut which went back to the roll, and there still can be seen in the Falerii example the carefully-formed opening through which a pin, no doubt of bronze, was passed to fix the whole securely to the timbers. Below the eaves the wall was enriched with plaques covered with rich ornament.

At the gable ends there was secured to the timber a moulded and enriched cornice of considerable height but of little projection, ending in a hollow crowning moulding, and having two large beads, and secured to the roof by curved struts similar to those of the antefixæ—two to each length of cornice. In the example now in London this cornice is painted, and the marks of the careful steady brush held some twenty-five centuries ago by some Etruscan ornamenter can be followed to-day by us in this specimen of his handiwork now stored in Bloomsbury.

Some ornamental tiles, for which it is hard to find a place, were found at the same spot, but there can be little doubt as to the position of a tile adapted to be the central ornament which crowned the gable of the Civita Castellana example, and they have found at the same place other tiles on which the same ornament runs from right to left in some, and from left to right in



PECKHAM THEATRE, LONDON. [MR. ERNEST RUNTZ, ARCHITECT.

others, showing that they were what we call purpose-made, and intended to go right and left from the centre of the gable.

Terra-cotta seems to have practically dropped out of use for a thousand years and more, and we next meet with it in certain countries during the Middle Ages, and still more frequently when matters were ripening for that outburst of revived Classic which we call the Renaissance, and which is the starting point for all modern art. Its use was resumed chiefly in countries where stone is scarce and timber not used in abundance, such as the alluvial plains of North Italy, Holland, and the Netherlands, South-Western France, and many parts of North Germany and of Spain.

BIRMINGHAM GENERAL HOSPITAL.—VIEW IN ENTRANCE COURTYARD.

The material does not seem to have been much employed, if at all, in the comparatively rude buildings erected before the great church-building age of Europe, namely, the thirteenth, fourteenth, and fifteenth centuries; it is met with much more frequently on buildings of the fourteenth and fifteenth century than in those of the earlier century. When the great change of taste occurred at the end of the fifteenth century terra-cotta held its ground for some time. It is true that in the buildings which were almost direct copies of ancient Roman ones, with columns, cornices, and porticoes, it was little employed; but it was freely used in those buildings which abound in the early stage of the Renaissance, where the new Classic features and ornaments and the Gothic ones are more or less blended, and where comparatively small arches and windows and profuse ornament were introduced; and it gradually went out of use as the general taste in architecture turned towards big features, such as could be best executed in stone or marble.

The cities of Milan and Pavia contain the finest examples of the use of this material, and nowhere is it so appropriately employed as in the Certora or Charterhouse of Pavia, a great Carthusian monastery, with cloisters and a large church of great richness and beauty; but in many other North Italian towns good specimens can be found.

Generally speaking, the terra-cotta there employed is in small blocks of very nearly the some coloured red as the bricks with which it is used, and very richly covered with cast ornament. Nothing to suggest that it is an artificial stone occurs. It always impresses one as a refined and ornamental brick, and this circumstance makes the Italian terra-cotta extremely useful to the designer.

In England, very few examples earlier than the Renaissance are to be found; still there are a small number of Gothic buildings with terra-cotta panels and other ornaments, and the beautiful moulded brick chimneys and ornaments of Tudor mansions may be claimed as coming within our range. When the sixteenth century brought to this country the new architectural style, the employment of terra-cotta became more customary. There are, for example, a series of terra-cotta busts of Roman Emperors used as ornaments at Hampton Court Palace, and other works in the same material at the same building; and two well-known monuments in terra-cotta, dating from early in the sixteenth century, stood in the old Rolls Chapel till it was very recently pulled down.

In Norfolk and Suffolk—counties where stone has to be brought from a distance—there exist a considerable number of mansions dating from about this time, in which terra-cotta, partly in the shape of fine moulded brick, is used for almost all the ornamental work; and the same thing occurs occasionally in other southern and western counties. In the shape of moulded and enriched brick, especially for the cornices and chimneys of domestic buildings, the use of material analogous to terra-cotta continued through the seventeenth century, and to some extent in the eighteenth.

The modern employment of terra-cotta may be said to date from as far back as 1786, when a Miss Coade started a factory in Lambeth for terra-cotta and artificial stone. It stood near where Eastwood's wharf now is, and under various names continued till about thirty years ago. A good many pieces of sculpture were executed here, among them the pediment at Greenwich Hospital, representing the death of Nelson. Rossi and Bubb, who, it is said, had been employed at Coade's works, and afterwards set up for themselves, executed, among other works, the eight figures called caryatidæ, standing at the north and south porticoes of St. Pancras Church, and the antefixæ, or small erect ornaments, on the principal cornice. These must have been set up about the year 1819, and so have been standing eighty years. The statues were executed in tolerably large blocks, and, though much discoloured by smoke, they appear to have stood the London climate extremely well; and the antefixæ, exposed to the full force of the weather, appear to be quite complete and in good condition, and, unless they have been renewed, their condition is a tribute to the durability of terra-cotta in the London atmosphere.

BIRMINGHAM GENERAL HOSPITAL.—VIEW FROM SOUTH-EAST.

The names of Blashfield, Blanchard, and Doulton, Gibbs and Canning, Pulham and Edwards, are among those which become prominent in the more recent development of terra-cotta. In the hands of these and other manufacturers it has been to a remarkable extent employed as a building material.

For some of these and other details I am partly indebted to a very exhaustive paper by Mr. Charles Barry in the "Proceedings of the Royal Institute of British Architects."

The more recent use of terra-cotta for important buildings may be said to be associated with South Kensington. The Science Schools; the Albert Hall, by General Scott; the Natural History Museum, by Mr. Waterhouse; and more recently the Central Technical Institute by the same architect, and the Imperial Institute, by Mr. Collcutt, show specimens of its use; the Natural History Museum being an especially important example. In other parts of London one may point to the Constitutional Club-house, by Mr. Edis; the Palace Theatre and City Bank, Ludgate Hill, by Mr. Collcutt; and the Prudential Insurance Company, by Mr. Waterhouse. Two very large terra-cotta hotels are now building.

The number of buildings in London of more moderate extent in which the material is employed is now so very great that it is not possible to do more than refer to one or two conspicuous instances. In Essex-street, Strand, there is a remarkable Renaissance front (by Mr. Gordon) covered with well-designed ornament, and well worth examining, as showing the capabilities of the material. Even more striking is the front of a recent building by the same architect in Parliament-street, near Whitehall, where the finely-worked terra-cotta enrichments are combined with brickwork. Here, however, there is in some respects an attempt to disguise the terra-cotta as stone. The theatre at Peckham, by Mr. Ernest Runtz, is a good recent instance of the successful employment of this material in which it is quite possible to fail as well as to succeed. Witness its employment in the recasting of the Russell-square houses.

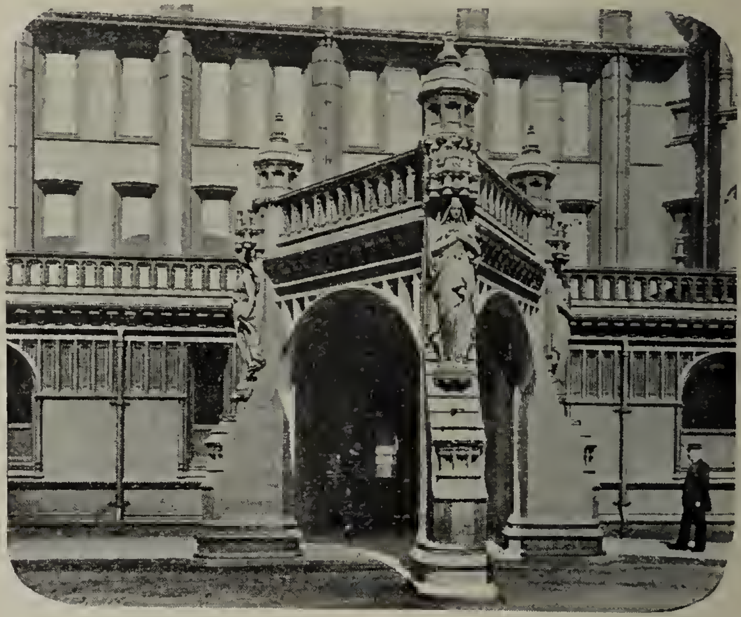
Terra-cotta is now manufactured with a high glaze and of various colours—in which condition it resembles faïence or glazed earthenware, and the two materials can both be employed and can be combined alike in the exterior and the interior of a building. Only a few days ago the President of the Royal Institute of British Architects said from his official chair that it was "refreshing even to think of London and other manufacturing towns presenting us with beautifully-coloured and enriched fronts that do not want painting every year," and regretted that "coloured and glazed materials for external facings, where the greatest beauty of colour and form may be used," were so rarely employed. This is now within reach, and the Birkbeck Bank in Southampton Buildings, Chancery-lane, the design of Mr. T. E. Knightly, for which Messrs. Doulton made the terra-cotta and faïence, is an unusual example of this employment of glazed and coloured materials. The extensive and extremely striking interior is not yet open to the public; and I shall therefore only say that when it is so open it will be well worth the while of any one having any interest in the subject of this night's lecture to inspect it.

BIRMINGHAM GENERAL HOSPITAL.—PATIENTS' WAITING HALL.

I have not sought for opportunities of showing you in the lantern what you can so easily see for yourselves in London streets; but I am glad to be able by the kind assistance of professional friends to show you what has been done in Birmingham.

The Assize Courts, the work of Mr. Aston Webb and Mr. Ingress Bell, are executed entirely in terra-cotta inside and out. The building is ornate but very effective, and the ornament, though it is profusely employed in parts of the building, does not interfere with the general breadth and dignity of effect, and is itself appropriate and beautiful.

The new hospital, the work of Mr. William Henman, who has most kindly caused photographic slides to be made for you, is a building of red brick with red terra-cotta enrichments, and very great pains have been taken to make the most appropriate use of the material, and Mr. Henman has introduced allegorical figures, modelled by Mr. J. Wenlock Rollins, of Chelsea, some of which appear in the photographs. He has attached importance to the surface given to the terra-cotta made for him by Messrs. Doulton. This is granular. "I had noticed," he writes, "that most terra-cotta cracked all over its surface, and eventually much of the face peels off, and after careful observation, extending over some time, I came to the conclusion that it was caused by the slight glaze on most terra-cotta. This results from silica coming to the surface in the act of drying before burning. This glazed surface is naturally cold and of greater density than the substance of the terra-cotta. Unequal contraction and expansion cause the cracking. Condensation on the cold surface, and frost cause the peeling. It, therefore, seemed to me that by corrugating or rather granulating the surface the cracking might be prevented, and, consequently, the peeling. The result has been most successful in this respect, and the general appearance is, in the opinion of all who have expressed their views to me, greatly to be preferred to the partially-glazed effects."



BIRMINGHAM GENERAL HOSPITAL.—PATIENTS' ENTRANCE.

I propose here to say a little about the manufacture and qualities of the material and later on something about its artistic capabilities.

Terra-cotta is a refined kind of brick; and, like brick, it varies in colour, texture, and durability. Speaking generally, the principal ingredient is either fire-clay or one of the fine plastic clays fit for use in making good earthenware, such as are found in Dorset, Devon, and Cornwall. This is generally mixed with a portion of fine sand and of old pottery or terra-cotta ground to a fine powder. The proportions—especially in cases where it is found best to mix two and more sorts of clay together—are the secret of the manufacturer, and are the result chiefly of experiment. Sometimes other ingredients are added with a view to serve as a flux to promote the fusion of the whole mass in the kiln. Much pains is taken to secure that all the materials shall be thoroughly and most intimately mixed, as the success of terra-cotta largely depends upon the material being quite uniform all through, so as to dry and burn uniformly, for warping and getting uneven and out of shape, is the disaster of which there is the greatest danger. The prepared material is moistened with water and so brought to a state in which it can be moulded.

For building-blocks a model is made of each sort of block required; from this a plaster mould is taken, and the clay is pressed into that mould and the piece so cast is carefully dried in hot air, and in drying becomes tolerably hard and firm. During the drying it shrinks, and if there be unequal shrinkage it warps and may be spoilt.

Sometimes terra-cotta work is not cast, or only parts of it are cast. In what is called the "direct work" process it may be modelled by hand, or ornamental pieces may be built up. This gives the opportunity for employing original work, varying from work of the highest artistic character to simple enrichments modelled in clay instead of being carved in stone, but capable of being undercut as castings cannot be.

The pieces of terra-cotta when dried are burnt in a kiln. It is possible to correct small irregularities that have shown themselves as the result of drying before burning.

The kiln is usually what is called a muffle kiln, that is to say, a kiln with a lining of brickwork within, and separate from the fabric of the kiln itself, so that the flame may not play direct on the goods. There is, I believe, room for a good deal of skill, or the reverse, in the charging of the kiln. It takes, roughly, a ton of coal to burn a ton of terra-cotta. The heat developed is very great, and the result ought to be to fuse or vitrify the entire mass of each bit of the material. In firing, the ware is commonly subjected to the action of a salt glaze, and the surface, after firing, ought to stand a test which I had best describe in the words of Sir Henry Doulton: "Take a sharp-pointed steel instrument, and if you can make an incision with it in the terra-cotta the tooth of time will attack it; but if it turns the sharp point of the steel you may be sure it is imperishable. The other test is acid, which in a short time will test its durability." On leaving the kilns the terra-cotta is very carefully and slowly allowed to cool.

The finished blocks do not ordinarily exceed from 3 ft. to 4 ft. cube, and in many cases are much smaller than that. Their height and their depth from front to back should be arranged so as to bond with brickwork. The blocks are always made hollow, partly to economise valuable material, partly to secure that the heat of the kiln shall completely pervade every part of the material. The ends of the block are, of course, solid, and if it is of any size one or more cross-pieces are formed to strengthen the sides and front; the back is usually open. It is customary and desirable, notwithstanding that terra-cotta is very strong, to fill up the hollow space with cement concrete, made with rather fine materials. Some authorities prefer Roman cement for this purpose, since some specimens of Portland, especially if not air-slaked, swell a little, and this is liable to crack the blocks if it occurs.

The finished piece of terra-cotta has shrunk from what it was when moulded. Part of the shrinkage takes place in the drying, part in the burning, but the usual result is that it is about one-thirteenth smaller every way. If, therefore, you desire to produce a block measuring 12 in. by 6 in. by 9 in., your mould must be 13 in. by 6½ in. by 9¾ in. This introduces one of the difficulties with which the manufacturer has to contend. The detail drawings sent by the architect show the size and shape that the finished article must be. The manufacturer or the architect has to redraw the whole to an enlarged scale and make the model to that enlarged scale, and the labour involved in this enlargement is often very great, nor is it always quite certain that the shrinkage will be exactly what is anticipated.

A further difficulty rises out of the irregularities which spring up in the kiln. Lines that ought to be straight are wavy. Surfaces that ought to be true are a little curved or hollow. The colour also is not always quite uniform when the articles are compared with one another. Where the heat has been greatest, the terra-cotta may prove to be darker than the average; and either the irregularity in shrinkage, in truth of line and surface, and in colour of exterior may be enough to cause a block to be unfit for use, much more if it is defective in more respects than one. There is also a liability to fire-cracks.

The advantages which terra-cotta possesses over stone are, first, the invaluable one that it is, when exposed to an acid atmosphere, more durable, being practically indestructible when good. Secondly, that it is cheaper, and if much enriched, considerably cheaper than stone. Thirdly, that it admits more readily of high-class original sculpture, or at least, original modelling; and, fourthly, that it admits—nay invites—a profuse use of appropriate ornaments, that is to say, such as can be cast in a mould and repeated many times over. Lastly, the colour is often good and is very much under control; and the material is far more suitable for use with brickwork than stone.

There are some minor advantages and some applications to modern uses to be named. It is stronger than stone, and yet lighter, which is advantageous for carriage, hoisting, and handling. Its surface does not readily hold impurities, so that it remains clean, and the rains wash it, and when used inside a building it can readily be cleansed. It is more available for casing in the structural ironwork of a building so as to protect it in case of fire, than any other material, and when so used it can be run into suitable shapes or ornamented without interfering with its usefulness as a fire-jacket. Terra-cotta tubes make the best smoke flues and ventilating flues, and terra-cotta bars are now often used to go from joist to joist in fireproof floors, and to carry the concrete or tiles.

The drawbacks to the use of terra-cotta are, however, not few, and some of them are serious. The first and the most important is that it involves delay, and it is not, like masonry, prepared on the job.

From the time when the manufacturer receives the drawings till the delivery of the first cargo on the work, you may fairly reckon on a delay of not less than six weeks at the very least, and then it may be that the blocks wanted first come to hand last, and, what is worse, that some block which is essential does not come at all, or comes too short or too long, or in some other way deficient or defective, and must be replaced. It is fortunate if the new block can be obtained in a month, and meantime it is quite conceivable that the brickwork of a whole wall, or even of a whole building, has to stand still. Of course, this may happen more than once in the course of a large building, and it is no exaggeration to say that months of delay may be, and often are, occasioned by this circumstance if there happens to be a run of bad luck or of misfortune.

Then the work being not prepared on the spot, it is difficult, often impossible, to make the most desirable modification in a building during progress, and all the business of templates and dimensions and generally fitting what would be the masonry to the rest of the work is most liable to go wrong, and necessarily becomes troublesome.

If a block which is of importance comes so different in colour that it cannot be accepted, or if it must be rejected on account of a defect, the consequences may be so serious that neither the architect nor the contractor feel half as free to deal with this material as they would with masonry. If the terra-cotta be thoroughly vitrified it is almost impossible to cut it or shape it in any way if it is in the slightest degree a misfit, and yet, owing to the warping and shrinkage which I have described, this material is peculiarly liable to be here and there thrown out of shape, even with the utmost care, and this calamity sometimes seems to pursue one particular piece, which may come to hand out of shape twice or three times running.

The remedy—as far as it can be remedied—for this class of drawback is to be found in extra vigilance—above all, a greater degree of forethought than is required with any other building material whatever; extremely good and careful general and working drawings made long beforehand, and a steadfast refusal to make any changes in the work during progress. One expedient which is sometimes attempted I strongly object to—the arranging matters so that the brickwork can be put up first and the terra-cotta added afterwards. This is not structural, and it of course adds to expense very greatly; but there are circumstances when even this desperate expedient must be resorted to; and in that case the ease with which terra-cotta can be shaped renders it possible to devise tolerably good arrangements for fixing it after the structure is up.

It is undoubtedly a drawback that the material cannot well be obtained with perfectly true straight lines and perfectly even surfaces. The curved pieces are also liable to be a little out of truth, but if the blocks are small it can be generally so set by a superior workman that this is not easily detected.

Terra-cotta in long lengths for lintels and cills is not obtainable. It can be joggle-jointed, as may be seen in many cases where it is employed, just as in Mediæval work the mantels of fireplaces were jointed; but some will feel that this is an imperfect substitute for a lintel in one piece.

In the Italian Gothic examples what one may call terra-cotta brick chiefly occur; that is to say, the blocks are comparatively small, are moulded and enriched profusely with such ornaments as are easily cast, repeated frequently, and are built up along with the bricks into the features of the architecture. They do not differ very greatly from the brickwork in colour, but they do differ in fineness of texture and surface, in sharpness, and in being ornamented. Here I think we have an example of the best employment of terra-cotta for the ornamentation of a building. The whole is perfectly harmonious and the ornamental part is quite appropriately similar to the plainer part, differing only just so much as is necessary to accentuate it. In London examples exactly similar in treatment are not numerous, but a fine one with red brickwork and red terra-cotta ornament is Mr. Waterhouse's St. Paul's School at Hammersmith, a building of Tudor character. The same architect has used the same materials in a fine Tudor dwelling-house near Putney Heath. His rebuilding of University College Hospital makes use of the same materials in a Renaissance design, and promises when the scaffold is struck to be a very effective exterior. The Birmingham Hospital is another good example. The same effect is obtained with sharper ornament though at heavier expense in many of the best modern red-brick exteriors when the enrichments have been carved out of the brickwork by hand. Mr. Norman Shaw and other architects have some excellent work of this sort.

In some of the late Italian examples the terra-cotta is more distinct from the body of the brickwork, and is of a different colour. This, I think, is so in part of the Certosa at Pavia. The features of this building, and of others similar to it, are usually small, and such and so enriched as can be easily and naturally executed in a material cast in moulds, and obtainable in moderate sized pieces. It is hard to overrate the beauty of some of the work at the Certosa. Among modern architects Mr. Collcutt seems to have best secured the class of effect I am alluding to. His Palace Theatre, his City Bank on Ludgate Hill, and his Imperial Institute are good specimens of buildings in which terra-cotta, in bands and in features and enrichments, is used simply and naturally; and the spectator can be in no doubt at the first glance that they have been designed specially to suit the material employed as their principal enrichment. Then there comes what must be called the stone treatment. In scale and in design the architectural forms, and sometimes the enrichments, are of a size and of a shape just such, or nearly such, as would have occurred had stone been the material, and the whole face of the building is of terra-cotta. Now there is a good deal to be said for such a treatment, especially in cities with a smoky and an acid atmosphere like London, but it represses the peculiarities of the material to some extent instead of bringing them out, and so far is less satisfactory.

For a manufacturing town, however, such as Birmingham, and especially for London, there is a great inducement to make use of terra-cotta as a substitute for stone simply because it will stand when stone will fail, and it will keep clean when stone will blacken, and because also stone is a very costly material to use in profusion, and terra-cotta is cheaper.

The science schools building on the east side of Exhibition-road has a series of columns of considerable size, in the design of which the artist (the late Mr. Godfry Sykes) has shown great intelligence. He has divided his column into heights by bands, which have enabled the manufacturer to produce a large column in a series of sections of not unmanageable size, and he has twisted his shafts, a proceeding which, dispensing with straightness, is particularly suitable when dealing with a material which it is not easy to get straight. I have always looked upon these as suggesting possibilities in the use of terra-cotta which other architects have not yet attempted to grasp.

The quality of terra-cotta which is the highest of all, and which is capable of producing the most brilliant results, is certainly one which has been not fully developed yet, and in which, consequently, lie the greatest possibilities for the artist of the future. I allude to its capacity for receiving and rendering permanent the original modelling of a sculptor or modeller. Plastic clay is the material in which the sculptor does the essential part of his work, and if, instead of the slow, laborious, and expensive process (largely mechanical) of transferring the modelled work to marble, stone, or bronze, the model itself can simply be baked and fired, and so made permanent, we bring the sculptor close to the public. We can have original work, in the production of which almost all of the fee goes to the artist, and comparatively a mere trifle is spent on costly material or manual labour, or anything else.

In many cases a not extravagant outlay would enrich the interior or the exterior of a building with noble and entirely original sculpture; not cast in a mould, but the actual work of the sculptor's own hand. If any of you will visit that architectural gem, the interior of the Guards' Chapel, you will see some of Tinworth's work in panels there, and will appreciate how much they contribute to add life as well as beauty to that interior. It is quite possible for any architect who has a modest sum at his command for the ornamentation of his building to enrich it with panels such as those by Tinworth, or to dignify the exterior with sculpture such as Mr. Henman has been able to introduce at Birmingham.

But work of far less pretension—a spandrel, a tympanum, some ornament to fit a single panel, can be had in most cases where it would be appropriate to employ it; and nothing is more valuable than even a single piece of original work of this class in adding dignity to an entire building.

To sum up in one sentence what appears to grow out of our examination of terra-cotta as a material for the architect's use, we may, I think, say that terra-cotta seems to be at its best when it is used along with brickwork (though this is not absolutely essential); when it is used in a building that is ornate rather than plain, and is employed in smallish blocks; when there is much enrichment, and much repetition of the same enrichment or ornament, but not many plain arrises and mouldings; when cornices have greater height than projection; when numerous small features are employed rather than a small number of bold ones; when use is made of the facility with which an ornament can be moulded and repeated; and last, but very far, indeed, from least, when original modelling is to some extent employed.

What there may be in reserve for us in the near future from the employment of glazed and coloured terra-cotta I do not pretend to prophesy, but that its use will become a conspicuous feature in the design of street buildings I cannot doubt. I sincerely hope that it will be taken up by architects who will employ it with good taste and self-restraint.

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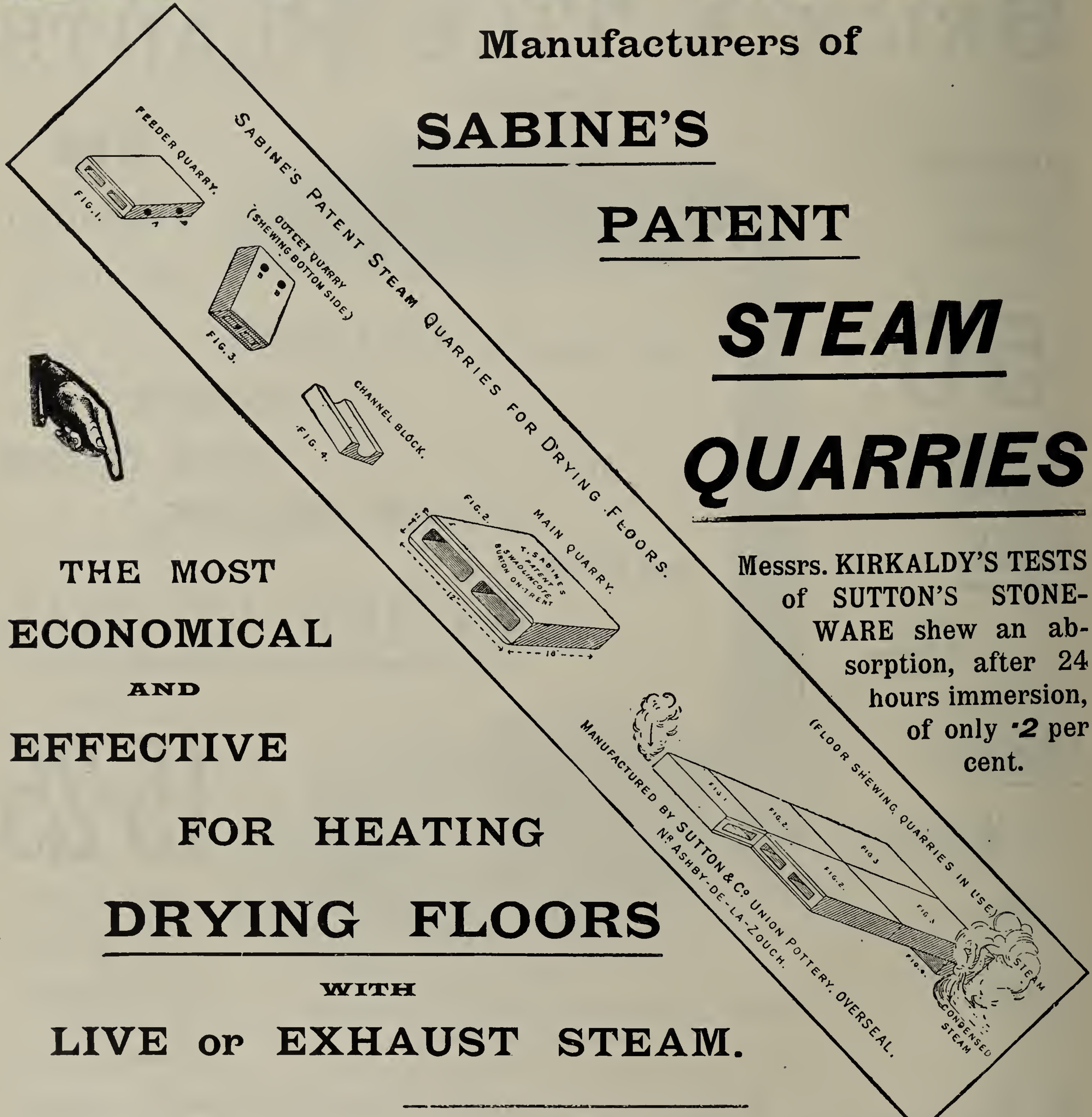
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FIG. 1.
OUTLET QUARRY (SHEWING BOTTOM SIDE.)
FIG. 3.
CHANNEL BLOCK.
FIG. 4.
MAIN QUARRY.
FIG. 2.
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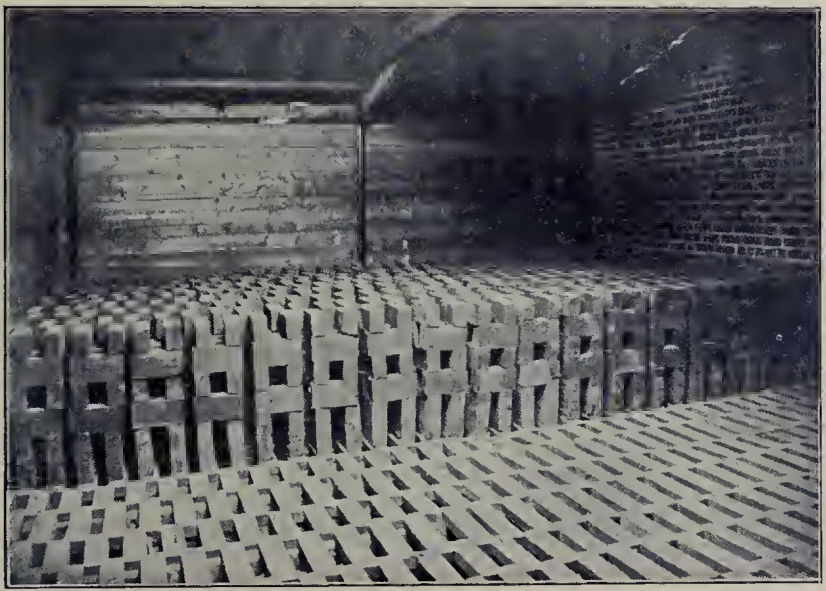

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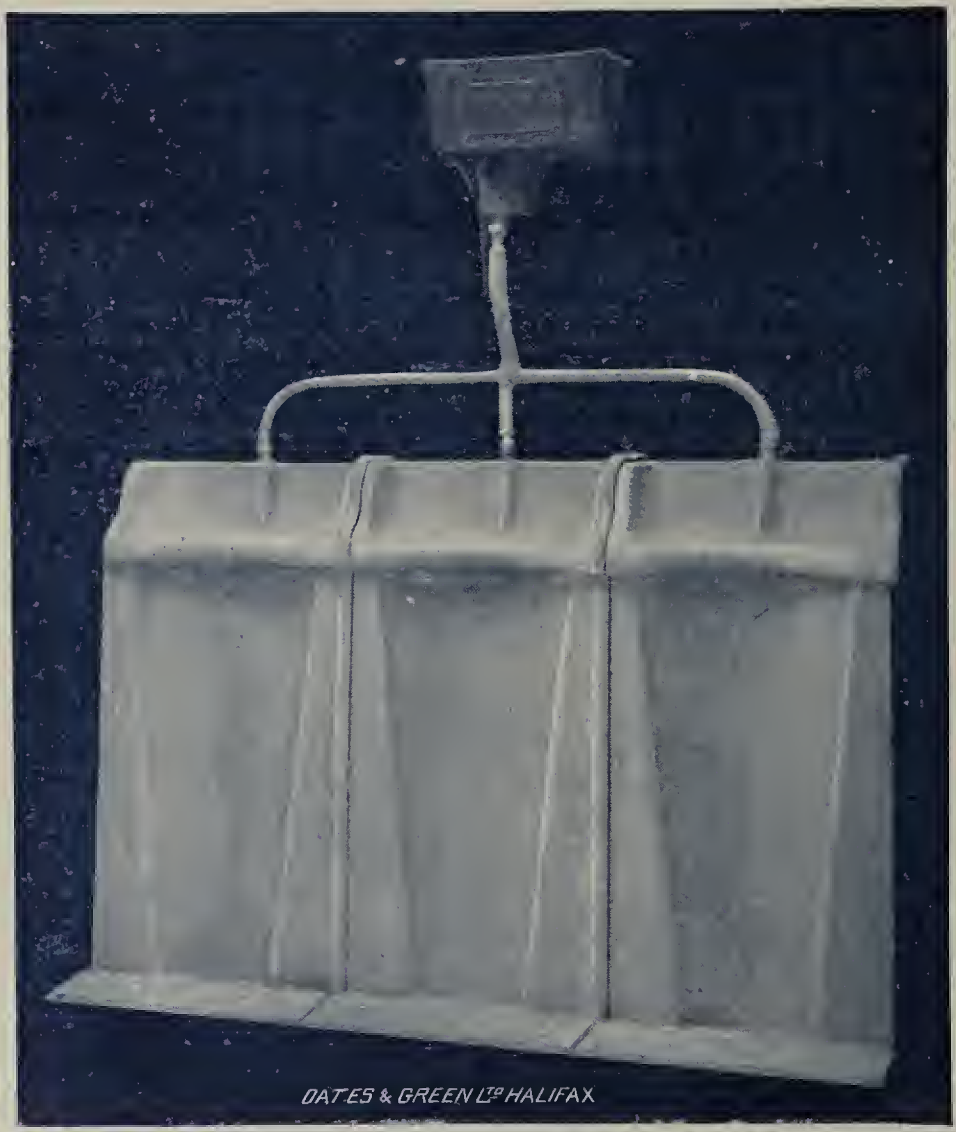

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OATES & GREEN, Ltd., HALIFAX.

THE INTERNATIONAL BUILDING TRADES EXHIBITION.

The Exhibition of 1899—admittedly on all hands the best ever held—was opened on April 26th by Professor Aitchison, R.A., President of the Royal Institute of British Architects. He was supported by the Presidents of most of the leading Institutes representing all branches of the building trades in addition to a large number of leading Architects and Surveyors in London and the provinces. The opening proceedings were held in the gallery. During the week formal visits to the Exhibition were paid by members of the Surveyors' Institution, Architectural Association, Institute of Builders, Association of Municipal and County Engineers, Society of Architects and Sanitary Inspectors Association.

Professor Aitchison, in declaring the Exhibition open, said that they had assembled to open the International Building Trades Exhibition. Most persons would allow that it was an important exhibition, as the mere fact of building even in so great a capital as London forced attention to it even while passing in a vehicle, but it was only when we considered the great number of industries that are necessary to it, that we could form a true idea of its importance. No building of brick, of stone, or of concrete could be erected without lime or cement, at least in this country (for we read of Babylon being built of bricks and asphalt). Who was the inventor of mortar we did not know, but we knew that the Pyramids of Gizeh were put together with it. Lime generally involved a quarry from which the limestone had to be extracted, the building of kilns, and the use of some sort of firing, carts and horses to draw the quick lime, and roads to draw them on, the building of carts, the leather and iron work for the horses, and food, clothing, and habitations for the men, and stables and food for the horses, not to speak of the men and materials required for making the road. It was to the necessity for limestone and fuel that we owe the destruction of so many temples and other grand classical monuments, and when he told them that the marble of the Mausoleum was used by the Knights of Rhodes to burn into lime for the repair of the walls of the Castle of Budrum just before it was taken by Solyman the Magnificent, they would not be surprised at the havoc made among the priceless monuments of antiquity, mainly from the same cause, the roofs being used for the fuel. Viollet le Duc gave a long list of all the trades and occupations that were involved in building. They were present, however, to see new inventions and new applications of machinery to their craft. The exhibition was more or less useful to every one, but it was particularly so to the architects. The application of machinery to all sorts of productions had been of immense advantage to all those engaged in building, and, of course, no less useful to those who occupied the buildings that the architect had designed and the builder executed. He might mention a peculiar use that he had seen one of the modern inventions in the exhibition put to. The invention was a sheet of wire-work. At the intersection of the wires small pieces of terra-cotta were strung on. Some of this wire-work he saw had been bent into the shape of a groined roof, and when plastered inside and out it made a very stiff and apparently serviceable roof, and if it only had the incombustible qualities that were claimed for it, it would be a very valuable preventive to the destructiveness of fire. There were doubtless hundreds of other serviceable inventions exhibited which might be used by the architect and the builder. He might mention one application of machinery to joiners' work that he was peculiarly grateful for. He once wanted to use some square moulded balusters, and the expense of working these by hand was too great to allow their use being thought of, but he found an exhibit here that had been worked by machinery which so much reduced the cost as to enable him to use the balusters. The ancients had used the fall of water and the force of wind for mills and ships, but just before our time the application of steam had increased our power of production at least a hundred fold, and Tennyson, whose poems were published in 1832, spoke of its last triumphs

> "In the steamship, in the railway, in the thoughts that shake mankind."

Shortly after that we had the electric telegraph, which has rivalled Puck's boast: "I'll put a girdle round about the earth in forty minutes." Electric lighting had come, and when we consider the progress of electrical science since the days of Pliny the Elder, to our knowledge of it to-day, to the X-rays which had shown us an undreamt-of power, it opened a vista which almost paralysed us to contemplate. On the present occasion there were exhibits of electrical appliances for lighting which had made a revolution in the illumination of houses and cities, and enabled us to get effects that were never even dreamt of before not to speak of the application of electricity as a motive power. One of the great revolutions that had taken place in his time had been the increased wages of the working class, and now it was they who gave the great stimulus to production; but, like other revolutions, it had not been wholly advantageous, for it had been the means of encouraging what he might call the manufacture of rubbish. Up to a comparatively late period England was celebrated for the excellence of her workmanship. English cabinet work was known abroad for the excellence of its wood and fittings and for the absence of artistic design, and England was, he hoped, still celebrated for the excellence and durability of its machinery; but in some classes of manufacture it was almost impossible to get anything that was really good. There was an insane desire to have things cheap, without regard to their excellence and durability, or even their temporary utility. The bulk of English cabinet work was very different from what it once was; small fastenings that had the appearance of solid brass bent in your fingers as if they were lead, while sash-lines and chair-bands were made of some stuff that was scarcely stronger or more durable than tinder. In certain trades there was a counterpoise to this passion for rubbish; in all the things that had to do with health, that were commonly called sanitary appliances, perfection of workmanship was one of the necessities. This was of an immense advantage to the workman and manufacturer; it taught them to be thorough, careful, and accurate, and not to scamp, for the tests which sanitary experts had learned to apply instantly discovered imperfect work or materials. Twenty or thirty years, or still longer, ago, he pointed out the enormous advantage it would be in manufacturing towns to have the whole outer faces of buildings covered with enamelled bricks or enamelled terra-cotta. This was done with white or pale-coloured bricks when there were questions of light to the premises themselves, or to those of their neighbours, but the appearance of such buildings was rather more hideous than when they were built of the ordinary brick. There were ridiculously few buildings of enamelled brickwork or earthenware where any attempt was made to give to them beauty of form and colour. This was due to three causes — to the wretched leasehold system; to the time required, and the accidents inherent in the potter's trade, both to shape and colour of fine earthenware; and to the desire of people to get artistic designs for nothing. As to the advantages, in the first place, dust and soot did not cling so much to a polished face as they did to rough and porous surfaces, and that which did stick might be pretty well cleared off by the free use of a water hose; but the thing he wished most to insist upon was the great importance to mankind of beauty both in form and colour. It could not be supposed that Nature did not know her business, and that her making almost all her works more or less beautiful in form and colour was not of some advantage to man. To him it seemed certain that all these beauties which pervade the earth, the air, and the ocean were intended for man's purification, solace, and delight, and that in great towns, where Nature's beauties were shut out, and where even the sky was obscured by smoke and dust, there must be a necessary lowering of man's intellectual and moral powers unless those gifted men who could impart beauty were employed to confer those beauties they had culled from Nature on the habitations, the furniture, and the utensils of town people. The late Charles Garnier, who was the greatest architect of our time, published in 1869 a book he called "Through the Arts" ("A Travers les Arts"), and in that he gave his dream of the beautification of Paris. "I picture to myself," he said, "the day when the tawny tones of gold will mark the monuments and constructions of our Paris; I imagine the warm and harmonious tints which will tremble under our charmed gaze. One will then have renounced those grand right-angled streets, beautiful beyond doubt, but as cold and formal as the etiquette of a noble dowager. The present inflexible regulations will have their period of reaction, and without hurting anybody each man will be able to build his house without making it exactly like his neighbour's. The grounds of cornices will shine with eternal colours, piers will be enriched with sparkling panels, and gilded friezes will run the length of buildings; the monuments will be clothed with marble and enamel, and the mosaics will make all in love with movement and colour. This will not be mean or false luxury; it will be opulence, it will be sincerity. The eye familiarised with all these marvellous tints and brilliancy will necessitate our costumes being modified and being coloured in its turn; the whole town will be one harmonious reflection of silk and gold." To take a modern instance, he (the speaker) thought our modern manufacturers might take a lesson from Wedgwood, who not only took the greatest pains to render his ware excellent, but also used as his designers the most celebrated artists of the day, and for this reason his ware was called for in every part of Europe, and, he expected, might be found serving its purpose now in many out-of-the-way places. When he first went to Italy, in 1853, it was quite common to have one's meals served on Wedgwood ware. But Wedgwood was only a tardy imitator of the originators of this traffic, the Egyptians and Phœnicians. Schliemann found some of the blue glazed earthenware of Egypt in Agamemnon's Palace of Mycenæ. This ware bothered the translators of Homer, who had no idea of the trade in blue ware, and in the description of Alcinous' Palace in the Odyssey, Pope supposes it to be metal—

> "The cornice high
> Blue metal's crown in colours of the sky."

And after these great traffickers the artistic Greek exported his vases and other fictile ware, enriched with representations from his poets or from folk-lore of his country. Those storied jugs, dishes, goblets and coolers now filled the museums of every civilised country in the world, and were their most cherished possession and their greatest boast. He had dwelt on this at great length, for he still hoped that our country might furnish to the whole world artistic productions which might vie with the works of Flaxman, if they did not equal the superhuman excellence of the Greeks. The saying of John Addington Symonds should be imperishably engraved on the minds of all those who dealt in artistic wares—"Nothing is imperishable but high thought, to which art has communicated the indestructible form of beauty."

Mr. J. W. Swan, F.R.S., proposed a vote of thanks to the Chairman for his remarks. In England, he said, we suffered from conservatism—a source both of weakness and of strength. We were too apt to adhere to old methods when new and better ones were pointed out, and it required such an exhibition as the one they were opening to make known the improvements which had taken place in the building art.

Sir Arthur Blomfield, A.R.A., seconded, and the motion was heartily agreed to.

A photograph of the party having been taken, an adjournment was made to the dining-hall, where luncheon was provided, Mr. Montgomery presiding.

The toast of the Queen having been honoured, the Chairman proposed the health of Professor Aitchison—"one of the most eminent of living architects and the most genial of men."

Professor Aitchison, in response, said "praise undeserved was satire in disguise." It had been a pleasure to him to open the exhibition and to meet so many of his brother architects, and to do a little towards the prosperity of the exhibition—one of the most useful and interesting which had been held in that Hall. Such an exhibition not only made architects and builders acquainted with new inventions, etc., but it gave the outside public an opportunity of seeing them too. He believed that the exhibition would be a success, and thought that thanks were due to the Chairman for the great time and trouble he had taken in the matter.

BRICKS, TILES AND TERRA-COTTA.

BY A CRITIC.

THERE is very little to be said about a brick when you have to describe it as it reposes on its stand. The exhibitor has more latitude and may say all sorts of nasty things about it, especially when it does not happen to be his own make. But this is only one of the little pleasantries of an exhibition, and the abused brick, being the best on earth according to its manufacturer, can well stomach the terrible denunciations hurled at it. Swelling with pride and good fellowship the exhibitor proudly points to his stand, and declares that the bricks, tiles, and terra-cotta there exhibited have not been made specially for the exhibition, but are selected from the firm's ordinary stock. At first sight this observation seems unkind, but that is not always so, in reality, when you come to look at the goods. These latter will, of course, bear inspection, and everybody on these occasions treats the matter as a good joke. Then you see an imposing piece of work with the label "sold" attached to it. In any case, that is a satisfactory title, only, by a misapplication of Wellerism the facetious visitor might enquire "which"—the article, or the purchaser?

But, joking aside, it is not a little remarkable that exhibitors seemed wonderfully content with the amount of business they transacted during the show. The humble brick could not, of course, be labelled "sold" because in truth it was already sold. The marvel to us was that there were so many bricks on view, seeing what a famine in bricks extends practically all over the country. One exhibitor told us that he had already on order so many bricks that—well we forget the number of noughts that should be properly added to bear out the statement. Another one could not possibly execute any more orders for six months. A London maker, with a distinctly "breezy" aspect about him, brought on, no doubt, by the breeze employed in making his stocks, told us that he had the most beautiful brick in the exhibition. The more up-to-date man assured us that his bricks were proof against microbes, the workman (apparently) in charge of the stall for the moment had previously informed us that these latter were "blackteria"—showing the effect of the school board on Nature's artists. Another exhibitor roundly declared that he had never heard of the BRITISH CLAYWORKER, but when our soothing influence came to exert itself, he amended his observations to the effect that he had "been a subscriber from the first." Good man! "Tell the editor that my show is the best of bricks and ornamental bricks in the exhibition," says he, and we have complied with his request. What more can he want? His name? No, we should get into too much trouble with other exhibitors, if we mentioned that.

Have any of our readers ever seen a "brick man"? We hear of "brick buildings," but a "brick man" is surely a novelty. Yet, there was one on view—"Let me introduce you to our 'brick man,'" said a representative of a big firm in charge of the sanitary stoneware exhibits on a particular stall, to us. So we not only saw, but chatted with the "brick man," and a very nice fellow he was, though, like ourselves, he did not find anything interesting to say about the bricks, except that there were "no others to beat them in the market." In fact, after visiting every brick, tile, and terra-cotta stall in the exhibition, we were reminded of the story told with reference to the granite proposed to be used in the building of the Admiralty Pier, at Dover, many years ago. The *dramatis personæ* present on the site of the pier was (1) the Chief Commissioner of Works, (2) a representative of a big granite firm, and (3) a bitter opponent of his in trade. Quoth the Commissioner: "We learn that the granite quarried by (2) is more durable than yours Mr. (3)." Says the latter: "Well, sir, it is like this—our granite will last for ever, whilst Mr. (2)'s granite will last a little longer." It was ever thus!

"Now look at this glaze, did you ever see anything better in your life?" It is always a point with us to be polite, so we answer the question as best we can. "Our glaze does not merely stick to the surface of the brick, as is the case in so-and-so's, but it is burnt into the brick itself." We test this statement with a lens, and make a few sympathising remarks. "The special point about our brick is its hardness and the smoothness of the surface which takes the glaze," says another. Having felt the brick, we quite agree with him; it would never do to insult a man with such a deadly weapon in his hands.

"Tiles, sir; nobody in the world can make such tiles as these," said one man to us, and we thought it was a good thing that that was so, after having noted the graceful curvature of our *quondam* flat friend, the pantile. The people down at Bridgwater are evidently well acquainted with the perambulatory propensities of rain, and have designed tiles to keep it out.

The rain might just as well expect to be able to penetrate the maze at Hampton Court, as to dodge round the ridges and gullies of these interlocking tiles.

These are just a few impressions gained in talking to people in going round the show. There is a sort of dry or semi-plastic humour about the average clayworker, and this is sure to exude on an occasion such as this, which shows that he is not only pleased with his goods, but with himself. And more power to him. To give some idea of the exhibits of bricks, tiles, and terra-cotta, let us speak of each stall in turn. Messrs. CANDY & Co. had a number of coloured and white glazed bricks made out of the remarkable deposit of clay at Heathfield, near Newton Abbot. The practical value of the glazes on these is too well known to require any comment. The bricks themselves are buff coloured, and contain numerous quartz sand grains. Another seam provides the raw material, of which the firm's fire-bricks are made ; these are burnt direct from the natural clay, no artificial substance being mixed with it. The buff "Olympia" granite paving bricks have only longitudinal channels, not cross-grooved. They are especially useful in stables, being practically non-absorbent, acid proof, and easily cleaned. They are burned at such a high temperature that they are vitrified throughout ; they resist a crushing strain of 445 tons per square foot. The firm exhibited a sample of buff brick put down in Leadenhall Street, London, in 1887. It is estimated that about 30,000 people have travelled over it per day since that time, and it has only now been taken up in consequence of putting down an electric main. The specimen is as sharp as it could possibly be, and showed but little signs of wear. Messrs. CANDY & Co. have gone to some trouble in analysing both the clay and the brick made from it. The result is somewhat surprising, when at first considered. The figures are as follows ; —

	Fire Clay.	*Fire Brick.*
Silica	77.30	82.90
Alumina	16.60	14.11
Iron peroxide	1.90	2.39
Lime and Magnesia	trace	trace
Potash (with some Soda)	trace	·54
Loss	4.20	.06
	100.00	100.00

The circumstance that on the clay being burnt the proportion of silica should be so much augmented, and especially that the iron should rise from 1.90 to 2.39 is certainly not easy to understand until we reflect that the fire brick is really a sort of essence of the clay. For instance, in the clay we see "loss 4.20" ; that is mostly water, which, of course disappears when the clay is burnt, and the proportion of mineral substances consequently are bound to rise. Again, these latter volatilise to some extent, which leads to corresponding alteration in bulk The firm's buff architectural terra-cotta was also represented.

The SOMERSET TRADING CO. showed, amongst other things, the application of their improved roofing tiles, by building a small roof. These tiles are 10½ in. by 6½ in., and are made under heavy pressure. A special feature was the "Patent Rainbar plain tiles" which have a transverse bar on the upper surface and a corresponding groove on the lower. These tiles thus not only interlock but keep rain, snow, etc., out. They are of an excellent uniform colour, and like other goods on the stand, are made of Bridgwater tile clay. There were a variety of red finials, and other specialities brought out by the Company.

Messrs. JAS. STIFF & SONS, in addition to sanitary stoneware had a very fine Corinthian cap showing what is possible in buff terra-cotta clays. We have rarely seen a better piece of work than this ; the delicate "undercuts," and the wealth of ideal foliage is most remarkable. Such work is a complete answer to those hypercritical architects who decry terra-cotta because (they say) the clay shrinks in burning, and warping of the design results. Of course, the clay shrinks, and so does all clay, in burning, but firms of any note allow for this, and the design is dealt with accordingly. A well executed arch panel in similar terra-cotta was also amongst the numerous clay goods shown by this firm.

Messrs. S. & E. COLLIER showed a large assortment of their goods. Amongst the novelties, we noted a sand-faced tile. This is moulded by hand, and the prime object of the sand-facing is to promote vegetation on the surface of the tile. This leads to a toning down of the tint, an object so greatly desired by most architects. The exhibit of architectural terra-cotta here was also exceedingly good. Red bricks, chimney pots, ridge tiles and pottery were well displayed.

Mr. E. HOLWILL, of Temple Chambers, Temple Avenue, showed an assortment of bricks, both glazed and plain, terra-cotta, &c. We noticed some buff stoneware facers, which are practically non-porous ; they have a smooth surface, are good reflectors of light, and are especially useful in air charged with steam and other forms of moisture. Both the red and blue goods were of good colour. A peculiar feature on the stall was the lustre tiles, which give off submetallic lustres of various tints. In connection with this exhibit there was a fine red panel in terra-cotta, made by the Measham Terra-Cotta Co., and there were also red bricks, &c., by the same company.

Mr. MARK GENTRY, of Sible Hedingham, Essex, had a most creditable exhibition. Here we were struck by the ornamental bricks especially. For some years we have advocated the employment of what is generally known to the public as "carved bricks," such as were used so successfully by mediæval Italian architects, and Mr. Gentry has certainly gone a long way to produce our ideal, albeit his ornamental bricks are not "carved." The great difficulty, in many cases, with this sort of clay goods is the production of an uniform tint. A large relief pattern—for instance, a cornucopia with attendant flowers and fruits—must be made in several pieces to have a good effect. If the colour of adjacent pieces is not exactly alike much of the value of the work is lost. But, with the specimens exhibited there was no such fault as this, and indeed the goods of various descriptions on this stall were practically uniform in colour throughout. Moreover, the patterns were in high relief and sharp, the "undercuts" being as clear as the rest. This stall amongst other things contained bricks of deep red colour, lettered relief bricks, orange rubbers, red hand-made facings and hand pressed facings, red rubbers which are made in various shapes, red moulded bricks, chimney pots, &c. These are all first-class red goods, sand faced. The arch bricks shown were of a special character, some of them being 2 feet in length, and in section tapered towards one end.

THE NEW MALDEN POTTERIES AND BRICKWORKS, New Malden, exhibited many samples of their red goods, including pressed, sand-faced, and wire cut bricks, and specimens of ornamental and plain horticultural pottery, &c. The Company also shewed a specimen of ornamental brickwork from the 1851 Exhibition, taken out of the walls of their works. The ornament is quite as clear cut as when it was first made, and testifies to the applicability and usefulness of the material at a time when ornamental clay goods used for building were not as well understood by the manufacturer as they are at the present day. We were much interested in the exhibit of this old piece of work.

Messrs. G. TUCKER & SON, of Loughborough, exhibited a selection of bricks, amongst which were hard bricks for sewers, as supplied to Cape Town and other cities. Ornamental bricks, red quarries, moulded sand facers, and red terra-cotta were also represented. The firm has recently opened a new brickyard at Loughborough, about one mile from their older establishment and on the Great Central Railway line. Messrs. Tucker expect shortly to put buff terra-cotta on the market.

Messrs. HOOPER & CO., of Southampton, shewed specimens of hand-made red facing bricks, a special brick, wire-cut, for engineering purposes, red moulded bricks in various patterns, red rubbers made from carefully prepared loamy clay, and "special" best red sand-faced hand-pressed facing bricks. These latter are of uniform deep red tint, made with a sandy face. Several shades of colour are obtained, and they are adapted for high-class building work. These bricks bear evidence of having been well burned.

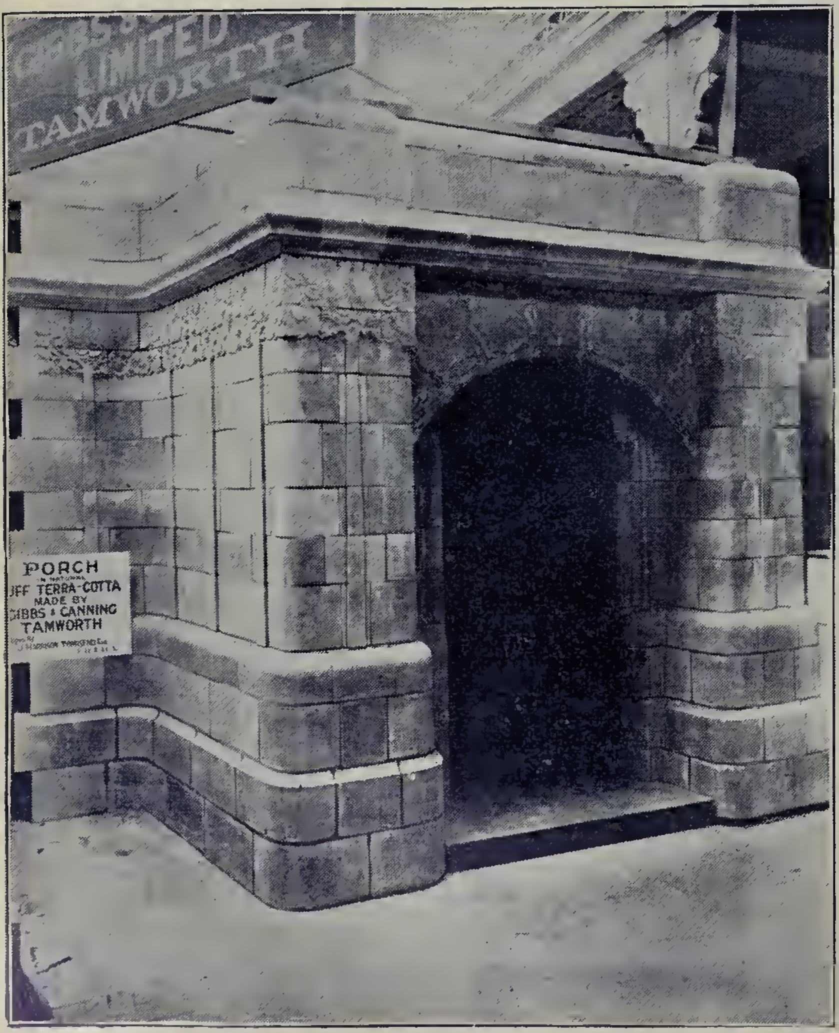
At the stand of Messrs. COLTHURST, SYMONS & CO., of Bridgwater, a miscellaneous collection of general building materials, manufactured by the firm, was exhibited. They principally consisted of red goods, tiles, finials, ridges, and bricks, both plain and ornamental. One of the tiles is an improvement in the class known as "Roman." The upper end of each tile is formed with a recess for the reception of one of the corners of the next adjacent overlying tile; the lower end of each tile being thus firmly held in position. At the same time the upper end of each tile is held down by the overlying tiles. By this interlocking the tiles are protected from disturbance even during violent winds, whilst tile nails are unnecessary. Nearly all the goods are red, and they are made of the well-known Bridgwater clay.

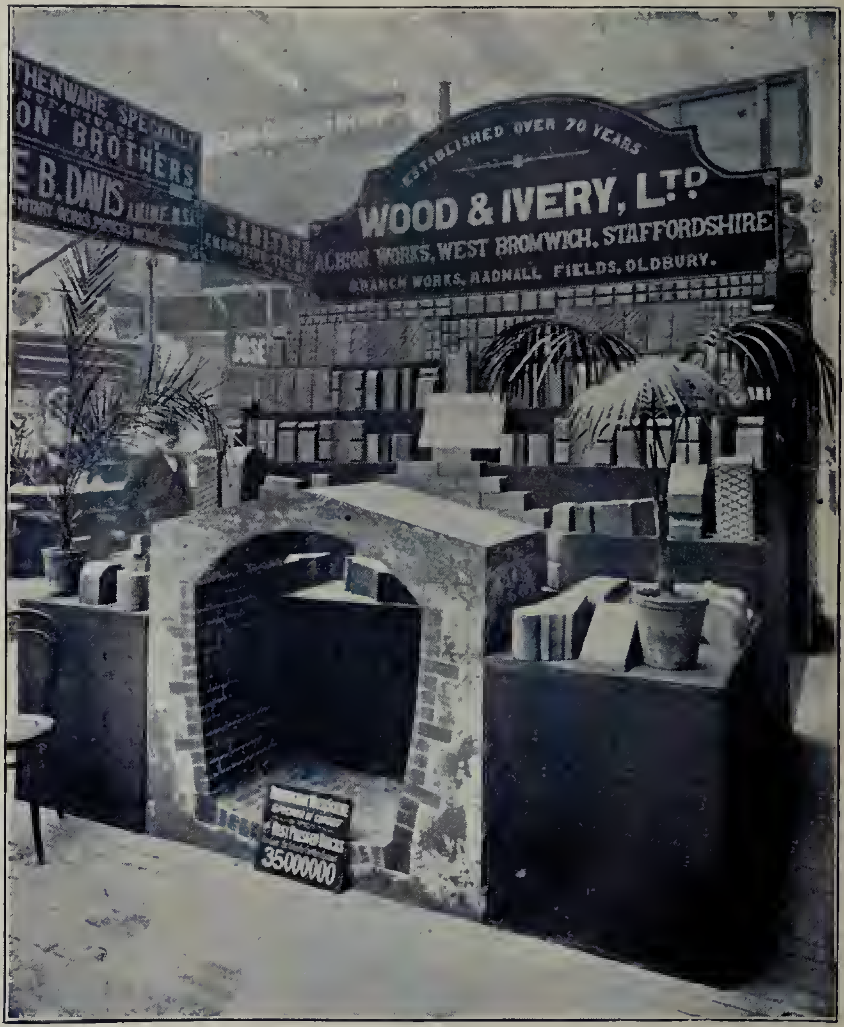
Messrs. H. J. & C. Major, of Bridgwater, exhibited a number of their specialities amongst which we noticed "Major's patent interlocking plain tiles." No nails are required to fix them, or pointing or bedding in mortar or cement. In each tile the three first rows uppermost are ridges, whilst the side U-shaped portions underneath are grooved. The corresponding tile to cover these fits into the ridges and grooves, and thus complete the interlocking. They are manufactured from Bridgwater clay, and each tile is subjected to a pressure of 60 tons. We also observed on this stand tiles of the double Roman pattern, angular corrugated pattern, as well as ridges, finials, &c.

Messrs. George Skey & Co. showed some vitrified blue bricks made from natural clay, without admixture of any foreign mineral matter, and largely supplied to railway companies. Also, salt-glazed, brown-faced tiles, and blue vitreous tiles, similar to the bricks mentioned.

In addition to the brick machinery exhibited by the Normanby Brick Co., there was an exhibit of Normanby glazed bricks. The white glazed were especially good, and the back of the bricks being practically non-absorbent, prevents discoloration of the glaze. The bricks are all of one thickness, and tests have shown that they can withstand a crushing strain of over 600 tons per square foot. The actual test indicated that, bedded between pieces of pine $\frac{3}{8}$ inch thick, the strain was 633·6 tons. Glazes in brown, stone, &c., tints were also on view, as well as brown-faced bricks.

Messrs. Gibbs & Canning, of Tamworth, erected a magnificent buff terra-cotta porch specially designed for the Exhibition by Mr C. Harrison Townsend, F.R.I.B.A. The bonding was remarkably good and the colour excellent. The same firm also showed terra-cotta vases, &c.

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Messrs. Wood & Ivery, of West Bromwich, had a stand on which was exhibited a variety of this firm's celebrated blue bricks, &c. These are extensively employed by a number of the great railway companies, various municipal authorities, and are exported to a considerable extent. They are especially useful for paving purposes. The stand contained a sectional specimen of the famous conduit now being constructed to bring water from the Welsh hills to Birmingham. This conduit is of concrete, lined with Messrs. Wood & Ivery's blue bricks.

Messrs. Joseph Brooke & Sons, of Hipperholme, had a number of white and coloured glazed bricks, the "Ivory White" glaze being a speciality. From an expert's report before us it appears that this latter is extremely durable and of special use for any work where there is dampness, or for use out of doors, or where the bricks may be exposed to frost. They can be heated and cooled practically with impunity within a very wide change of temperature without the glaze either peeling or changing colour. Many examples of salt glazed bricks were also shown. The same firm exhibited their patent "Grip" wall tile which requires no nails nor screws, and is readily and firmly fixed. It would seem almost impossible for a wall face made of these tiles to bulge outwards; and the tiles are made so as to bond with the glazed bricks alluded to.

Messrs. Jos. Cliff & Sons, of Baltic Wharf, Waterloo Bridge, S.E., on one of the handsomest stands of the Exhibition, exhibited several peculiar kinds of partition bricks, &c. There was the "Shepwood patent partition" brick, which can be finished with a glazed or ornamental face on one or both sides, or plastered, or limewashed. This brick has hollow spaces passing vertically through it, so that when the bricks are placed over each other with bonded joints, the spaces are continuous; and they also have continuous frogs on both beds. These spaces and continuous frogs are grouted with concrete as the bricks are built in position, thus forming a web or network of concrete which firmly holds the bricks together. Solid partitions, 2½ inches in thickness, may be made with these bricks, and are extremely useful where space is valuable. Adams' patent dovetail frog brick shown by the same firm is undercut along the longitudinal edges and affords a firm grip. These bricks are keyed with each other. Tiltman's patent partition bricks, glazed bricks, white, coloured and salt glazed, Hall's patent hanging tiles, slabbed and loose, and Gregory's patent locking tiles were amongst the numerous finely-finished exhibits of this firm.

Messrs. Towers & Williamson showed samples and paving of their "Adamantine Clinkers," especially used for paving stables, fire-brigade stations, abattoirs, coach houses, cattle markets, &c. These clinkers are made plain, and with chamfered edge buff or red in colour ; they are practically non-porous. The chemical results published by the firm relating to three seams of fire-clay indicate that the raw material is excellent ; and the clinkers are of a very high-class quality. These clinkers are laid on at least 4 inches of Portland cement, or 6 inches of Lias lime cement concrete.

Messrs. Broad & Co., of South Wharf, Paddington, amongst other things shewed some excellent malm facings, Southall red wire cut bricks, especially useful for engineering purposes ; red facing bricks, malm paving bricks, picked Cowley stock, picked stock facers, also Cowley stocks and shippers.

The Rowlands' Castle Brick and Tile Works had an excellent exhibit of their specialities. The firm erected a full-sized gate-pier, panelled with their red terra-cotta. This, in itself, would enable one to form a good idea of the nature of the work the firm puts out—if one had not known it before. The bricks in the pier matched each other exactly, and the terra-cotta panels and cap set the whole off very well. We understand that the entrance to the firm's works, at Rowlands' Castle, will shortly be enriched by the erection of a pair of gate-piers like this. The bricks are noted as being especially hard. The whole are manufactured from the well-known mottled clay found in the district. The clay is plastic and, without mixing any artificial material, burns to a deep red of uniform tint. This uniformity is, however, only brought about by careful preparation of the clays. A number of bricks which have been tested indicate that they withstand a pressure of over 300 tons per square foot before being crushed.

Mr. James Woodward, of Swadlincote, exhibited together with his sanitary exhibits some bricks with a beautiful glaze in many colours, on which even a lens examination failed to detect starring or crazing. The colours were very uniform, and the glazes were well burned into the bricks so that they should not peel off. There were also brown salt glazed blocks shown in connection with a manhole of remarkable design, alluded to elsewhere in this article.

Messrs. John Knowles & Co., of King's Road, St. Pancras, N.W., in a large stall, had specimens of buff fire-bricks as used by some of the large iron and steel firms in Sheffield, as well as in glass houses in many parts of the country. The goods are made from the "Wooden Box" fire-clay seam, near Burton-on-Trent.

The Ketley Brick Co. erected a handsome building of their "B.B." brand of pressed red facings and red terra-cotta. Also, blue Staffordshire bricks as used for building, paving stables, copings, &c.

Italian Artistic Tile Co., 95, Wigmore Street, W.—A very attractive display was made by this company in the gallery, several novel features being shown in their faience work, while their floor and wall tiles attracted considerable attention.

Messrs. Hall and Boardman, of Swadlincote, showed a few of their wire-cut red-bricks amongst a large exhibit of stoneware sewerage pipes and fittings.

Messrs. Doulton & Co.'s special features did not include much terra-cotta work ; but the firm showed amongst many other things on their elaborately arranged stand, the Cockrill-Doulton tile, glazed in white, blue, and other tints.

The Farnley Iron Co. built an ornate wall of white, olive green, and deep brown glazed bricks, of a quality for which this firm has become deservedly famous. The Ibstock Colliery's Leicestershire red pressed facing of bricks looked extremely serviceable ; and the firm also had some excellent terra-cotta on view.

Messrs. Oates and Green, of Halifax, although they had a large stand, did not exhibit many specimens of brick. The bricks are make of fire-clay, are of uniform thickness, and the glazes are very fine, of good clear colour, and of smooth surface.

Messrs. Stanley Bros., of Nuneaton, showed some improved salt-glazed bricks of excellent quality in the walls of a little building they erected, as well as loose glazed bricks and some tiles.

Messrs. Rockhill Bros., of Commercial Buildings, Commercial Road, S.E., exhibited amongst other things, samples of Stourbridge fire goods, including bricks, air flues, hollow bricks, and fire-bricks for arches.

Mr. W. Barnsley Hughes, of Forest Brickworks, Tunbridge Wells, showed a capital selection of bricks and quarries, chiefly of a red tint ; also samples of the clay, which is red and yellow mottled.

Messrs. James Oakes & Co. built low walls to show the use of their bricks made of surface-clunch as well as under-clays ; they also had perforated bricks.

Not the least interesting exhibit in this section was the effect of Messrs. Julius Hülsen & Co.'s "scum and discoloration" preventor. This is mixed with the natural clays and is burned with them, and by chemical action in the kiln efflorescence or scum is rendered practically impossible.

SANITARY EXHIBITS.

At no time has sanitation received so much attention from those interested in the "Building" industry than at the present. Public opinion has been aroused and educated to the necessity of really effective sanitation, as essential to the health and well-being of the community. The clay-working industry has not been behind in following up and meeting the somewhat exacting demands of sanitary engineers and others in connection with pottery. The progress made, and the high standard attained]in pottery, as applied for purposes of sanitation, has never been equalled in any previous exhibition. Indeed, apart from the number and variety of the exhibits generally, the most noticeable feature of the Building Trades Exhibition for 1899, was a large increase over preceding years in exhibits pertaining to sanitation. In this direction alone, to say nothing of new features in the way of an Electrical Appliances section—a section in which clay-workers might have shown to great advantage—and in the way of a Smoke Abatement section, the exhibition of 1899 must take precedence of any former exhibition of the series.

Seeing that the exhibitors numbered, with many others, such well known firms as Messrs. Doulton, Ltd., Geo. Jennings, Joseph Cliff & Sons, The Farnley Iron Co., Messrs. Candy, Ltd., Messrs. Stiff & Sons, The Albion Clay Co., Ltd., James Woodward, John Knowles & Co., Messrs. Hall & Boardman, Ltd., George Skey & Co., Ltd., Messrs. Oates and Green, Ltd., Geo. Howson & Sons, Ltd., Messrs. J. Mitchell & Co., etc., and that these firms had, for the greater part, exhibits that were almost wholly connected with practical sanitation in some form or other, a large and varied assortment of sanitary appliances met the visitor's eye on all sides. And further, a pleasing feature of the pottery exhibits generally was the absence of "show wares," wares kept for purposes of exhibition only. There was a healthy freshness about the wares, a more honest workmanlike appearance, than was ever possible with "show wares," made and stocked for the purpose. It is satisfactory to note that the remarks offered in the columns of this journal. for the past few years, in condemnation of the system, has at last found acceptance at the hands of exhibitors.

Sanitary appliances cover a wide field, so to speak, running up, through all grades, from the common sewer-pipe to the highest grade lavatory and bath work of the mansion, club or hotel. However, the difference lies in finish, ornamentation and style, between the commonest and best of our sanitary productions, rather than in fundamental and working principles of construction and design. Running water, and plenty of it, is essential to perfect sanitation; this, together with perfect trappage, fall, and a clean run, are alike necessary for the commonest or the best work; hence seeming differences—the material, construction and workmanship being sound—are more apparent than real. Lead among the metals, a close semi-vitreous body, practically non-absorbent, among the clays, are the best materials known for the work. Enamelled iron or tinned ditto, will always, in all probability, be in demand; but for absolute permanence and lasting durability, enamelled or tinned iron does not compare favourably with lead, or with a stoneware or semiporcelain body, having the foregoing properties for sanitary work.

Messrs. Doulton, Ltd., had a large and excellent show of their well-known sanitary fittings and wares, an elaborately fitted and decorated bath with back-ground being particularly good. Some white-glazed lavatories—a cheaper line—were, perhaps, rather lumpy on the glazed surfaces; still, for high grade and beautifully decorated sanitary wares, to say nothing of some richly-glazed mantles and fire-places, there was nothing better in the Exhibition.

FARNLEY IRON CO.'S EXHIBIT.

Messrs. Geo. Howson & Sons, Ltd., of Hanley, had a very fine exhibit of white enamelled fire-clay sanitary wares, remarkable for their dead flat surface, even colour, and freedom from distortion. A range of lavatory basins, with imitation Queen Anne marble tops, burnt in, were particularly neat and effective.

GEO. JENNINGS, the old-established sanitary engineers of South London, hardly did justice in this exhibit to their high standing and reputation in the sanitary world. Their exhibit, though fairly large, was somewhat trivial in character. It consisted, for the most part, of lavatory fittings and connections, good and sound, however, of their kind. Their stoneware exhibit, as manufacturing potters, was small, both as regards number and size, and we should have liked to see a more open exhibit, with two or three fitted and erected lavatory ranges, and work of a similar character, which would have been more characteristic of the best work of this well-known firm.

Messrs. JAMES WOODWARD & CO., Swadlincote, near Burton-on-Trent, had nothing of an ornamental character, but their exhibit of stoneware, salt-glazed pipes and connections, was worth going a long way to see; we have seen nothing better.

Messrs. HALL AND BOARDMAN, LTD., were also showing a large assortment of salt-glazed stoneware, distinguished by an absence of any "Exhibition finish," but just salt-glazed stoneware of the highest grade.

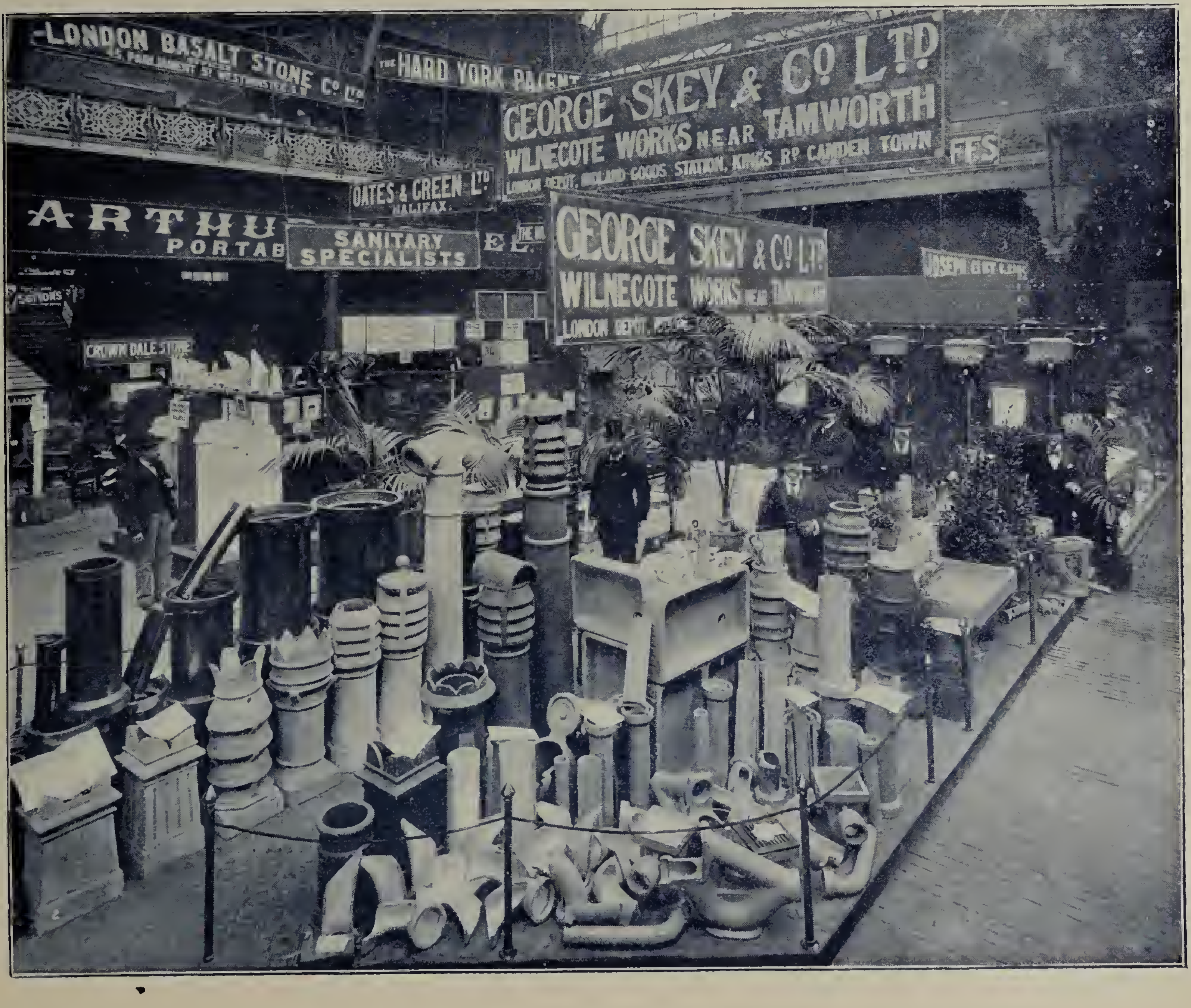
The ALBION CLAY CO., LTD., though not showing as largely as in former years, had some excellent stone-ware street gullys on view, circular and oblong, which for size, make, finish and burning, afforded an object lesson to makers of similar goods; we saw many worse.

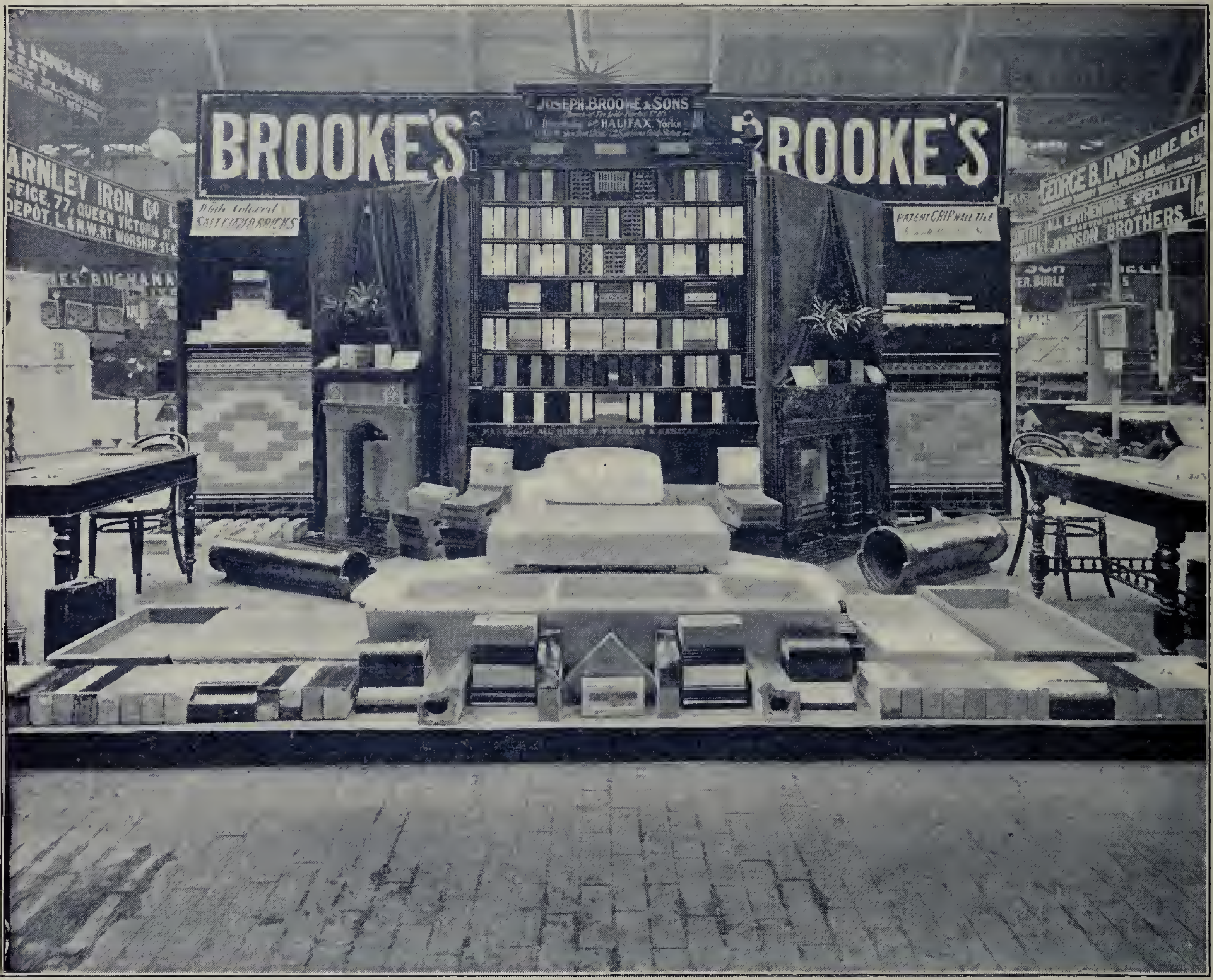
Messrs. JOHN KNOWLES & CO., had a special position in the hall for the display of their "Vitrifine" stone-ware pipes; a large and useful show.

The preceding four exhibits were practically confined to salt-glazed stone-ware pottery, and are in every way deserving of special mention in their own particular class.

White enamelled fire-clay sanitary wares were pretty much in evidence all round; Messrs. J. MITCHELL & CO. having, as in former years, a very large show of these wares. Several exhibitors were also showing sanitary mangers in glazed earthenware which, apart from their obvious cleanliness, should prove useful in cases where horses have a tendency to gnaw, as they sometimes do, the wooden manger tops as ordinarily fitted.

Messrs. CLIFF & SONS, FARNLEY IRON CO., Messrs. CANDY, LTD., GEO. SKEY & CO., and Messrs. STIFF & SONS had large and excellent exhibits, but more general in character; however, porcelain baths, slop-sinks, water closets, urinals, sewer pipes, etc., formed no inconsiderable part of the exhibits. One or two doubtful stone-ware bodies were noticeable in connection with the exhibition, but such cases were few and far between. Dry, open, and loose fire-clay bodies are of course used for baths, sinks, etc., in conjunction with slip and glaze; the slip and glaze giving the impermeability necessary for the work. But such bodies do not take a salt glaze readily, and cases were not wanting where the wares had been subjected to a preliminary dip for the better reception of the salt-glaze, with the result that pin-holes of considerable size and number were plainly evident. Sand and fire cracks, though not so pronounced as in former years, were here and there noticeable in the salt-glazed wares; however, this, as the result of defective manipulation, presents no real difficulty to the clayworker—the hint will doubtless suffice. All things considered, those responsible for the sanitary exhibits in the Building Trades Exhibition of 1899 have every reason to be proud of the show, which embraced so much variety, excellence, and sterling worth.





THE EXHIBITION.

BY AN ARCHITECT.

To the architect a visit to the biennial Building Trades Exhibition has become a matter of course, nay, we had almost said a matter of necessity. This may at first sight be deemed a personal opinion, but it is proved beyond doubt a fact from the increasing number which have passed the turnstiles since the Exhibition has been under the able directorship of Mr. Montgomery. The cause of this increasing appreciation of the Exhibition by architects is not far to seek, for it is the natural outcome of that old and true economic theory of supply and demand.

Year by year the profession becomes more overcrowded, and year by year the strain of practice and the necessity of keeping *au-courant* with up-to-date manufactures becomes more difficult. The architect therefore naturally takes care to make use of any facilities which are put before him and which enable him to gather in a day that which in an ordinary way would entail weeks of labour. But it is in reality more than that which entices architects to the Exhibition who formerly held aloof. It is the absence of the "side show" element which detracted so much from the Exhibitions of former days and which deprived those Exhibitions of that serious and business-like character which they now assume.

Personally, as an architect, I should prefer to miss the Academy rather than the Exhibition, for most of the best buildings are published in the building papers, but nowhere but in the Building Trades Exhibition can one see the manufactures and materials connected with architecture placed before one in a single hall, all properly catalogued and provided with showmen whose duty and business it is to explain their manufactures.

And here one might fitly remark on the appreciation which architects have for an intelligent representative who can explain without exaggeration the principal advantages which the exhibits are said to possess. Indeed it is perhaps but right to mention in a criticism such as this, that the Building Trades do not take sufficient care in selecting their representatives. Very often on approaching a very interesting exhibit of some new ware for example, one is confronted by some one, man or boy, who is simply told off to watch the stall. This is a mistake. Anyone who is really serious and whose time is limited, turns away from such a person and hies him to a stall where he can be treated as a business man and not as one strolling in as a matter of curiosity. The writer knows of several instances where good orders have been lost in consequence of this, and he throws it as a hint for future occasions. The exhibitors should not lose sight of the fact that it is a business exhibition. It differs *in toto* from a show at the Royal Aquarium and therein lies its strength. But we are to note more especially the clay-working exhibits as they affect the architect.

Speaking generally, the clayworking exhibits of bricks, tiles and sanitary manufactures, &c., are about as good a collection as the writer has ever seen brought together. They reflect extreme credit on the designers and manufacturers alike, and show that in this department of our national industries we can hold our own against the world. Whether this is due to the clay which is utilized, to its careful and effective preparation, or to the workmanship which is put upon it, or to all three, it is not for us to determine, but certain it is that for excellence of finish and craftsmanship the clayworking exhibits are a great credit to all the firms exhibiting. All the principal firms appear to exhibit, and although it is impossible to mention all, we may note a few of those which happened to draw our attention.

Messrs. Broad & Co.'s sanitary goods of all kinds are well worthy of attention, and the built-up "manhole" must have been a welcome sight to many a budding architect.

Messrs. Gibbs & Canning had an interesting exhibit, and as a specimen of workmanship included a porch in buff terra-cotta from the designs of Mr. Harrison, Townsend.

Messrs. T. Mitchell & Co. had some excellent specimens of sanitary goods, including reformatory basins with running water and Butler's sinks with glazed supports. Their siphonic closet also works well on trial.

The "Grip" wall tiles of Messrs Joseph Brooke & Sons are exceedingly useful for fixing weather partitions on walls and should be better known by architects. Mr. James Woodward of Swadlincote had also excellent examples of his well-known work. For workmanship his sanitary goods could hardly be surpassed. The same can be said of the work of Messrs. T. Knowles & Co., and they have excellent little models which will act as useful reminders to architects. The "Wyvurst" channels are a capital invention and should have a large sale.

Messrs. Doulton had an interesting exhibit both in faience work generally and in sanitary goods. Their faience mantelpieces are excellent in design and manufacture, and the schemes of colouring are effectively managed. Their glazed bricks acting as a facing to concrete walls are most useful.

The Farnley Iron Co.'s exhibits uphold the reputation of the firm for good workmanship, their lavatories and urinals being beautifully finished.

Mr. G. B. Davis, of Westminster, has some excellent lavatories, &c., combining new features, the "Tip up and lift out" being a move in favour of cleanliness. The movable office lavatories are also worthy of inspection and would be useful to architects where private offices are small and no lavatory attached.

The earthenware exhibits of Messrs. George Skey & Co. are noticeable, especially the chimney pots either glazed or not. These are known as "spiralvent" chimney tops and we should imagine they would help a smokey chimney.

The name of Joseph Cliff & Sons is a sufficient guarantee that their exhibit is a good one, one of the best on exhibition perhaps, and contains many architects' inventions, such as Shopee's dovetailed bricks, &c.

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We noticed the moulded salt glazed bricks of Messrs. Candy as something new, also their channel sections and adamantine clinker bricks for stabling and paving.

Messrs. Stiff & Sons exhibited some fine specimens of buff terra cotta, and Mr. George Jennings, of Lambeth, had an exhibit which formed a capital résumé of the sanitary engineer's appliances of the present day.

Lowe's Patent Sanitary Pipe Joint Co. and Messrs .Shanks & Co. were also well represented.

We have still the brick and tile manufacturers to deal with and we are not going to spare them. We ask them plainly do they undertand their business? and we answer the question ourselves by saying they do not. In short, architects cannot get sufficient bricks to complete their buildings, for apparently the existing firms are not able to supply them.

It is true that the building trade has been rather brisk the last year or so, and it is quite possible the various makers have been rather hard pressed to keep up with the demand, but there is no excuse for the paralysed condition of the trade at the present time. Nearly every contract is stopped for want of bricks, and great inconvenience is caused to architects and their clients, besides the penalty clause falling very heavily on the builder.

One thing is sure to come, and that is a great many new brickfields will have to be opened and architects will have to see that it is so. It is preposterous that buildings should have to be delayed because brickmakers do not keep their machinery up to date so as to be able to cope with the demand. Among the brickmakers exhibiting are the Rowland's Castle Brick Co., S. & E. Collier, of Reading; H. J. & C. Major, Mark Gentry, The Somerset Trading Co., whose "Rainbar" plain tiles seem a capital invention. Here we must draw our remarks to an end by saying that the clayworking exhibits form the most important section in the Exhibition.

A full report of the machinery and plant shown at the Exhibition will be given in our next issue.

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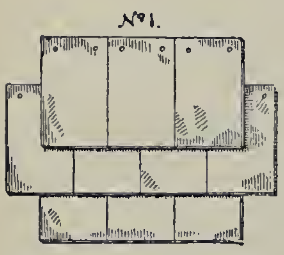

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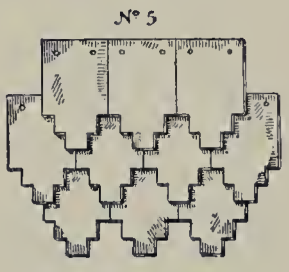

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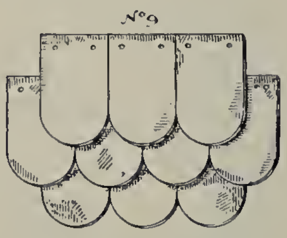

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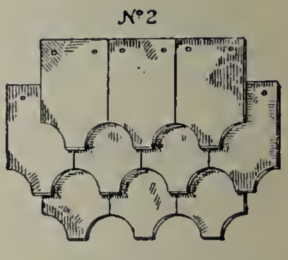

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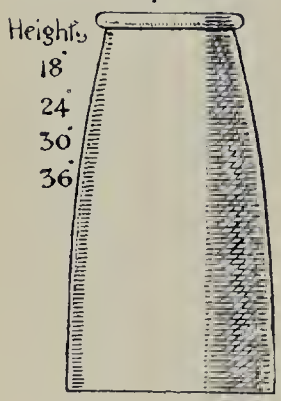

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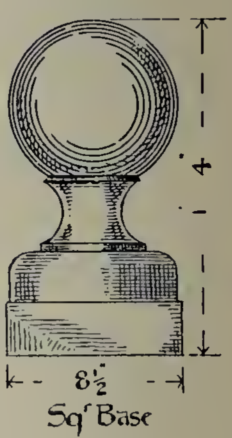

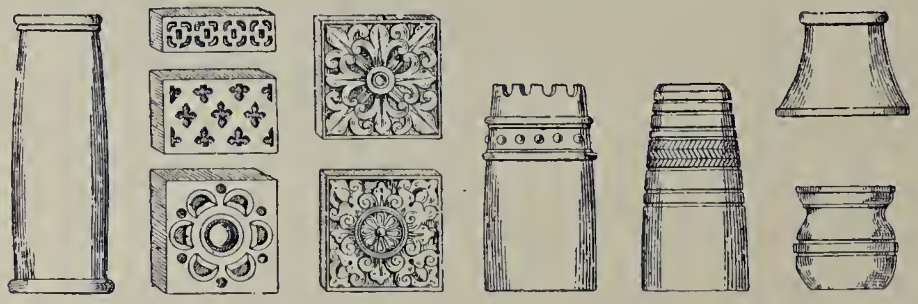

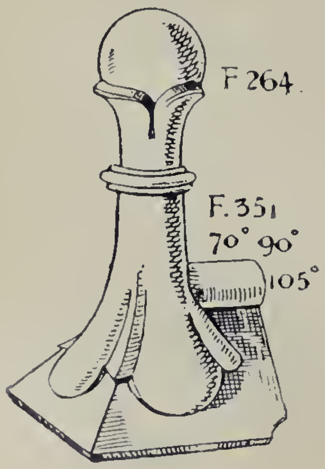

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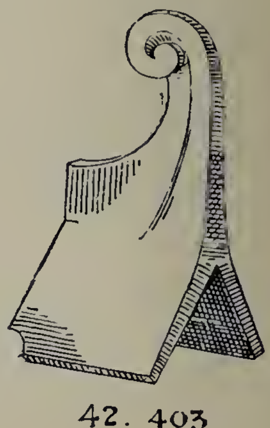

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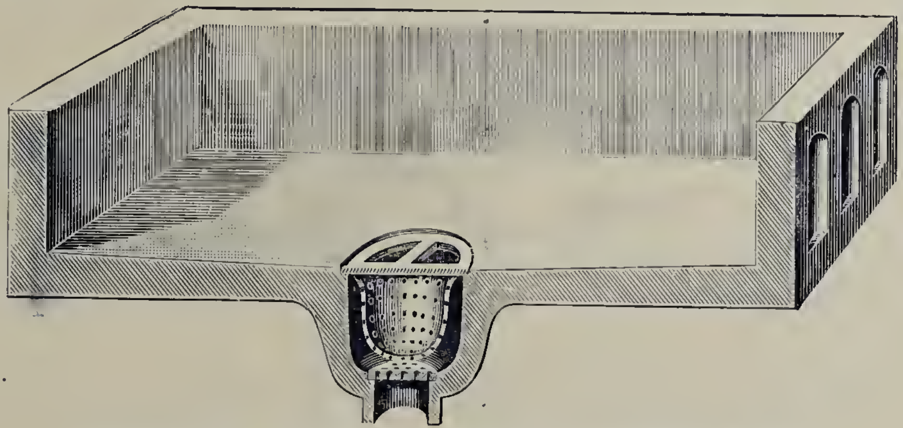

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SUPPLEMENT TO THE BRITISH CLAYWORKER.—JUNE, 1899.

THE BRICKBUILDER.

CLAYWORKERS' TRIP TO GERMANY.

To describe the Clayworkers' Trip to Germany as a success is hardly to do it justice. It partook more of the nature of a royal progress, so crowded was it with feasting, function and ceremony. If evidence were needed of the importance of the Institute of British Clayworkers it was to be found in the magnificent reception it received on its visit to the Fatherland, and it is a significant fact that at the last dinner of the trip in Berlin, representatives of the *Times,* the *Standard* and the *Daily Telegraph* were present, besides the German press, to do honour to the gathering. The success of the trip was due mainly to two factors—the princely hospitality and the untiring exertions of Mr. Arthur Koppel, and the *bonhomie* and good nature of the 58 gentlemen who composed the party. Nothing could have exceeded the kind feeling and considerateness which permeated the party, and which alone makes for a party's enjoyment. The trip went with a swing, and its gaiety was infectious even unto the stolid German, who by this time has probably begun to wonder where "jolly good fellows" are made. In any case we called ourselves and our friends so often by this title that there is no doubt we have obtained from somewhere or other a prescriptive charter to it.

THE PARTY AT BOCHUM.

The names and addresses of the jolly good fellows are as follows, and they are open to receive engagements with people suffering from *ennui* at home, or with parties who make continental travelling a misery :—

Messrs. A. W. Anderson, Stonehouse, Glos ; L. B. Atkinson, Cardiff ; — Ashburner, Isle-of-Man ; Thos. Alty, Hesketh Bank, Preston ; A. C. Batley, Southampton ; G. B. Blakesley, J.P., Ashby-de-la-Zouch ; Edward Bolton, Cambridge ; Thos. Bridge, Burscough, Lancs ; W. Carter, Parkstone, Dorset ; D. S. Chilton, Alsager, Staffs ; B. Cole, Cambridge ; E. P. Collier, J.P., Reading ; W. H. Collier, Mark's Tey, Essex ; F. H. Cooke, Peterborough ; J. W. Courtis, J.P., Cardiff ; Wm. Cunliffe, Kingston-on-Thames ; G. H. Downing, Chesterton, Staffs ; J. R. Featherby, J.P., Gillingham, Kent ; Walter C. Gibbs, Cambridge ; Richard Glasspool, Rye House, Herts ; Arthur Goodall, Stoke Newington ; Geo. Goodall, Worthing ; Jas. Heaton, St. Helens, Lancs ; E. R. Herbert, Peterboro' ; J. A. Herbert, J.P., Peterboro' ; — Higgs, Peterboro' ; Jos. Higson, Bolton ; J. P. Holdcroft, Tunstall, Staffs ; W. E.

Hawley, Liverpool ; E. Hughes, West Bromwich ; W. B. Hughes, Tunbridge Wells ; F. Jewson, J.P., Earith, Hunts ; Geo. King, Northampton ; — King, Junr., Harold Wood ; J. C. Laxton, Ely ; W. G. Milsom, Reading ; John Mitchell, Edinburgh ; H. Greville Montgomery, London ; S. J. Newman, Parkstone, Dorset ; G. Riches, J.P., Cromer ; Wm. Rowley, Chesterton, Staffs ; M. Shillito, London ; W. A. Smith, Northampton ; W. W. Smith, Worthing ; J. G. Stein, Bonnybridge, N.B. ; H. Stephenson, Accrington ; J. D. Sutcliffe, Manchester ; Maurice Sutcliffe, Manchester ; Jas. Thornton, Liverpool ; S. Tompkin, Manchester ; — Townsley, Hull ; H. A. Turner, London ; Dr. Twamley, Hedingham ; J. Waldie, Edinburgh ; W. C. Webster, West Bromwich ; — Webster, West Bromwich ; G. W. Williams, Newport, Mon. ; and A. R. Wood, Stoke-on-Trent.

MR. ARTHUR KOPPEL.

And here one must not forget to mention the formation among certain members of the party (wild horses would not drag from us their names) of a syndicate for the furtherance of the Clayworkers' weal. The capital asked for (as is usual in syndicates run for the benefit of other people) was large, and we believe we are not betraying secrets when we state that the founders' shares were applied for many times over. The preference shares, however, hung a bit, and it was perhaps unfortunate that such a scheme should have been launched at a time when the "Clayworkers' weal" (no connection with the Great Wheel) was in an eminently satisfactory condition. The only unfortunate part of the business was that the generous founders of the syndicate received no honour in another country, and it is a sad reflection on the public morals to think that the gentlemen who worked so hard and continuously (for their own benefit) had, perforce, to return to England, a disappointed and broken-hearted triumvirate.

MR. H. A. TURNER.

The first page of the programme was got through on Thursday, May 18th, when the party assembled at the Holborn Restaurant for dinner, with Mr. E. P. Collier, J.P., in the chair. All the party were present except two members of the syndicate who, we understand, were engaged in negotiating a final coup and in purchasing sundry articles of disguise, before seeking the shelter of foreign shores under the guise of clayworkers. A pleasant crossing and early morning found the travellers on the way to Bochum, the first stopping-place on German soil. What jovial recollections the name conjures up. The word itself

MR. B. NOETZEL.

induces smiles, but the remembrance of the great function connected with its name must be indelibly engraved upon the mind of every member of the trip. And with it the name of Arthur Koppel stands out conspicuously. For was it not he who out of his unbounded hospitality made a record feast for Britishers? And to make a record nowadays is to make fame and name. The reception took place in the public park at eight o'clock in the evening, and not a member of the party saw an end of it, for in the early dawn, while with measured steps and slow the party were retracing their steps, the band still played for very love of playing. It was a charming evening, the first warm day for weeks, and the Stadtpark, dressed in all its bright spring livery of green, gave a gay welcome to the banquetters. At one end of the pavilion, the band of the Cuirassier Regiments from Deutz, near Cologne, of some 40 performers, under the Royal Music Director, R. Fellenberg, was stationed, and the room was hung with flags and floral decorations. Each diner was presented with a specially prepared menu, a book of songs printed in German and English, and a musical programme in addition. And of the banquet, what shall be said? Well, it was worth while going all the way to Westphalia to get such a right-down royal welcome as Mr. Arthur Koppel extended to his guests that night. Unfortunately Mr. Koppel was not there himself, but Mr. Westphal, chief of the Bochum office, did honour in his stead, and made an excellent host. I doubt if Mr. Koppel will ever get to know the whole truth about that dinner. Snatches of description will doubtless reach his ears from time to time, but to have understood it to the full one must have been there to see. Dinner commenced punctually at 8 o'clock, and punctually at 12.45 cheese was served. During the intervals wine was served. Two men were kept as hard as they could go removing empty bottles. The only people who suffered were the teetotallers, as at midnight the supply of water gave out and recourse had to be had to the public pond. The toasts were received with the greatest enthusiasm, not the least being that of Mr. Arthur Koppel, whose name received an ovation. As time grew on the enthusiasm increased, helped not a little by the splendid band which could not do enough to please its appreciative listeners. And then near breaking-up time the company fairly let itself go. Never had the Stadtpark seen such a jovial rollicking party. It sung verse after verse and sung itself hoarse, to the loud accompaniment of the band, and when it could sing no longer it shouted for very joy. Staid Germans fell on each other's necks and wept. Grave Clayworkers who proudly lead village choirs at home yelled forth "Johnny Comes Marching Home," and "Let 'em all come," as though they had sung such songs from infancy. Sober citizens who as churchwardens collect the pious pence of Sunday congregations reiterated again and again that morning should come (it had already arrived) before they would go

BRICKWORKS, RECKLINGHAUSEN.

home; grave directors of limited liability companies whose knees find their proper place under mahogany, stood on the table and frantically waved soiled serviettes; some stood on their legs, some on their heads, and some did not know and cared less at which end of their anatomy they poised.

But the end came at last, and every man went home like a good and sober citizen to bed.

SATURDAY.

The following morning everyone was up betimes and ready for business. A detachment of wagonettes arrived soon after 8.30 a.m., and a start was made for Recklinghausen, where a visit to brickworks had been arranged. The morning was cold and showery, which somewhat militated against a ten miles drive over none too-well paved roads. However, it gave one the opportunity of seeing something of rural German life, and it certainly put the livers of all the party in good order. There was a faint suspicion in the minds of some of the party that we had got off the track, but Mr. Tompkin's hopefulness was reassuring, and we eventually landed in a quagmire and finished the journey on foot. Flags were flying in honour of our visit, and no time was lost in sight-seeing.

THE BRICKWORKS.

At this yard clay and sand are mixed in equal proportions and taken up an incline plane by a cable haulage plant, then mixed with water and regularly supplied to a mill. On leaving the mill the material drops into a first pair of smooth rollers, having an opening of $\frac{1}{6}$ in. to $\frac{3}{16}$ in. Here the clay is completely crushed and afterwards falls into an open mixer. In this the material is thoroughly ground, and on leaving the mixer it is taken to a second pair of smooth rollers with an opening of about $\frac{5}{64}$ in., through which the clay enters the brick machine. The bricks are cut off two or three at a time, the machine turning out 1,800 to 2,000 bricks per hour. The machinery is supplied by the firm of L. Jaeger, of Koln-Ehrenfeld, and the power to work them is supplied by a 60-h.p. steam engine. The steam is produced in a 2-flue Cornwall boiler of 860 square feet heating surface. The bricks after having been cut are set up on wagons carrying 160 each. These wagons, of which the firm have some 180, were supplied by Arthur Koppel, of Bochum, and they are pushed on four different lines into a drying tunnel with an initial temperature of 18 deg. C. and a final temperature of 120 deg. C. The drying is effected by means of air previously heated and kept in motion by ten fans. In the first six chambers the air is heated by waste steam passed through a steam heater, while in the four last chambers the air is heated by passing it over a coke furnace. In 24 hours the drying process is finished, and the green brick comes out of the dryer completely dried after 24 hours. The wagons are automatically pushed forward on all four lines in intervals of 60 to 80 minutes.

COLOGNE CATHEDRAL.

The capability of the dryer is about 15,000 bricks per day, at a cost of about 8d. per 1,000 for fuel. The dryer was constructed by the firm of Moller & Pfeiffer, and those of the party who went to Copenhagen last year will remember seeing there a dryer of similar construction.

From the dryer the bricks are taken to a Hoffmann kiln and set in the usual manner.

Exclusive of ground, we understand that the whole plant was erected at a cost of about £10,000. Twenty-thousand bricks are burnt per day, *i.e.*, in per year of 300 working days, 6,000,000 bricks of German standard, size $9\frac{13}{16}$ in. × $4\frac{11}{16}$ in. × $2\frac{9}{16}$ in. = in millimetres 250 × 120 × 65.

For night work at the dryer and the kiln the necessary light is supplied by an electrical plant with five arc lights and eighty incandescent lamps.

After drinking the health of the proprietors of the yard (in their own beer), and thanking them cordially for their courtesy, a move was made for the railway station and train taken for Bochum. The party then walked to Mr. Arthur Koppel's works, which had been decorated in our honour—giving a very festive appearance to the works—and were received by Mr. Westphal and his staff. With rare regard for tact we were conducted without more ado to the luncheon table. This was set out in one of the biggest of the machine sheds, and a very imposing sight it was.

The gallery was hung with the flags of both nations, and the ground floor converted into an avenue of trees. A most excellent luncheon was served, and this, coming immediately upon our banquet of the previous evening, filled most of us with surprise, and put another feather in the cap of Mr. Koppel. Toasts followed to the absent host and his present staff, and after cigars and liqueurs had been served, the party perambulated the works at their leisure.

KOENIGSWINTER ON RHINE.

Afterwards the party were driven to the hotel, which they had scarcely reached when a violent thunderstorm broke over the town. This cleared, however, in time to allow of the party getting away comfortably to the station, and paying their last *adieux* to a town that will always call up much happy reminiscence.

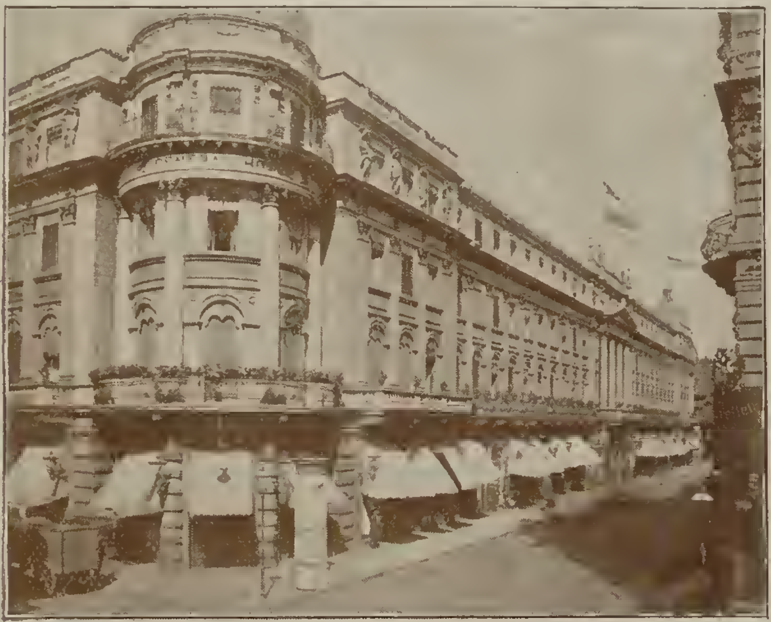
COLOGNE.

After Bochum, Cologne came as a restful change. We arrived there late, at 9 o'clock, and half of the party made their way to the Hotel du Nord and the others to the Hotel Grosser Kürfurst. The former is the bigger hotel of the two, and possesses a charming garden, but the latter fronts immediately on to the cathedral square and makes up in internal decoration what it lacks in portentousness. Sunday was essentially a day of rest, and was spent as the inclinations of each man prompted.

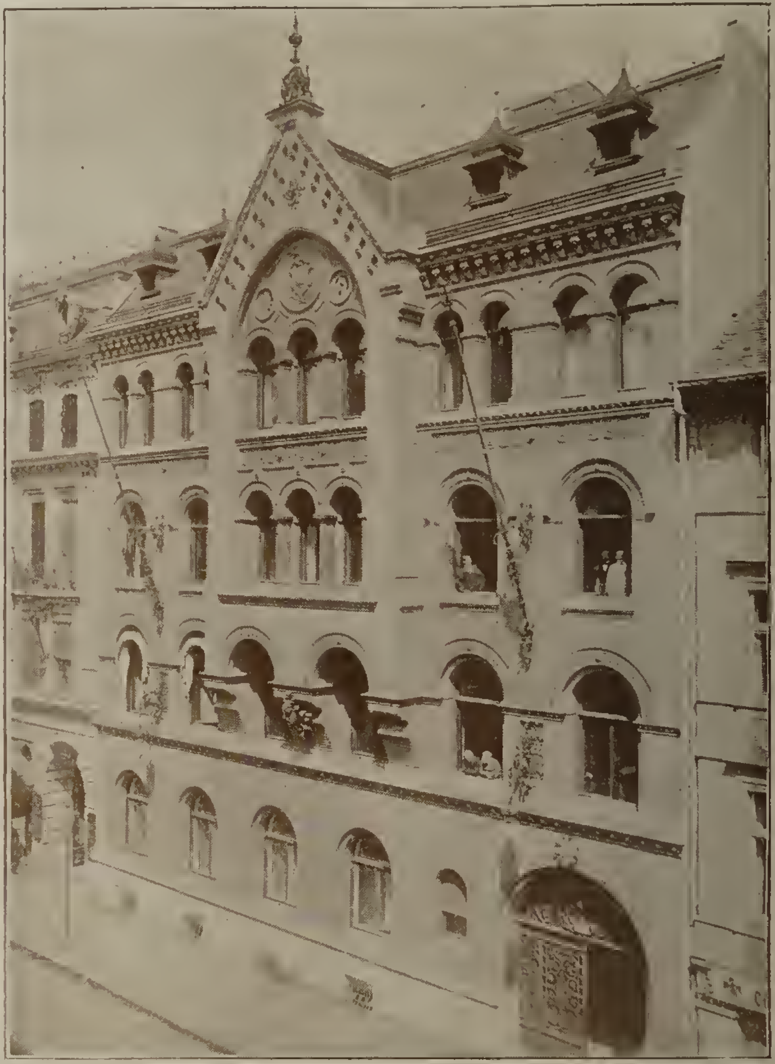
ON THE RHINE.

Monday morning saw the party early astir, for it was necessary, in view of the Bank Holiday, to make an early start in order to secure reserved carriages. The precaution was, however, quite unnecessary, as the morning opened with a drizzling rain, which diddled the railway of its expectant crowds. We crossed to Koenigswinter by ferry, and at this time the rain had ceased and the mists began to rise, showing the delectable hills in the distance.

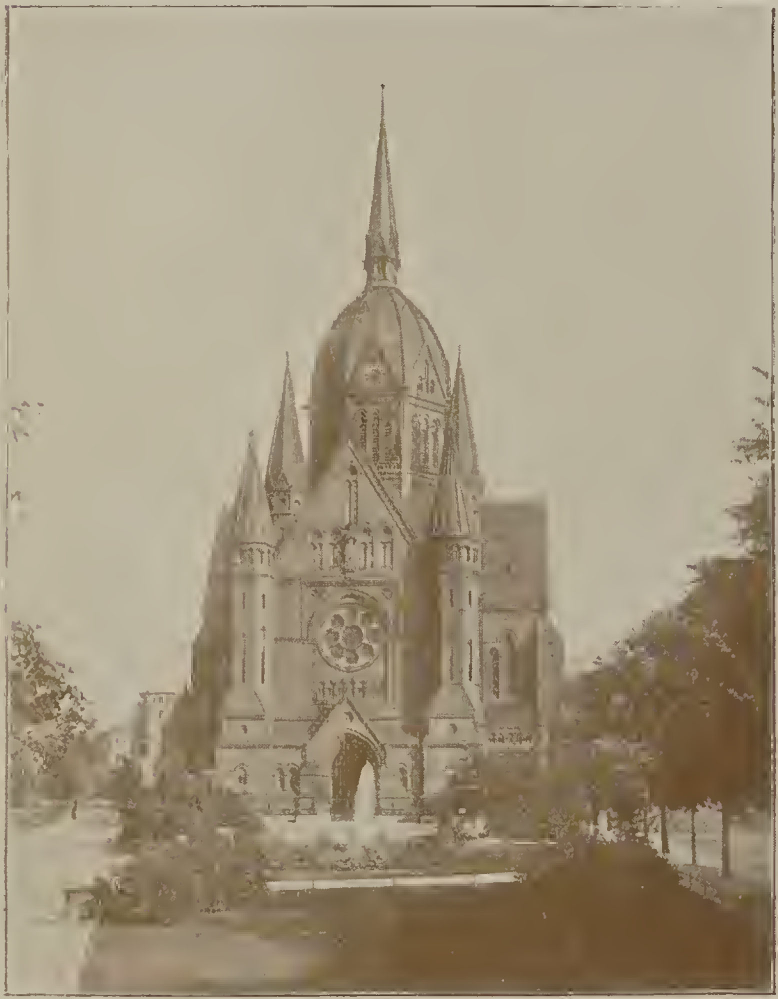
Those who made the journey to Petersberg on foot had perhaps the best of the weather, and the walk up through the vineyards was a charming one. On reaching the summit, however, one was enveloped in a Scotch mist, and only secondary glimpses could be had of the Rhine and the surrounding scenery. The mist, however, failed to damp the ardour of the



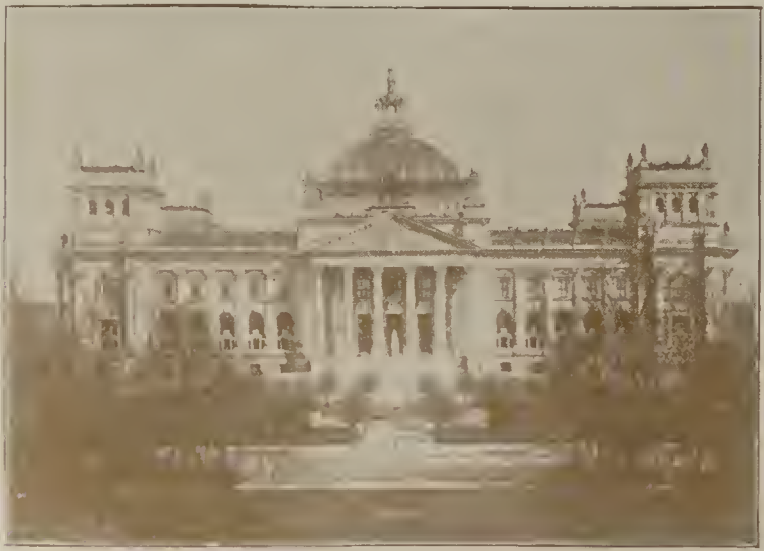
HOTEL CENTRAL



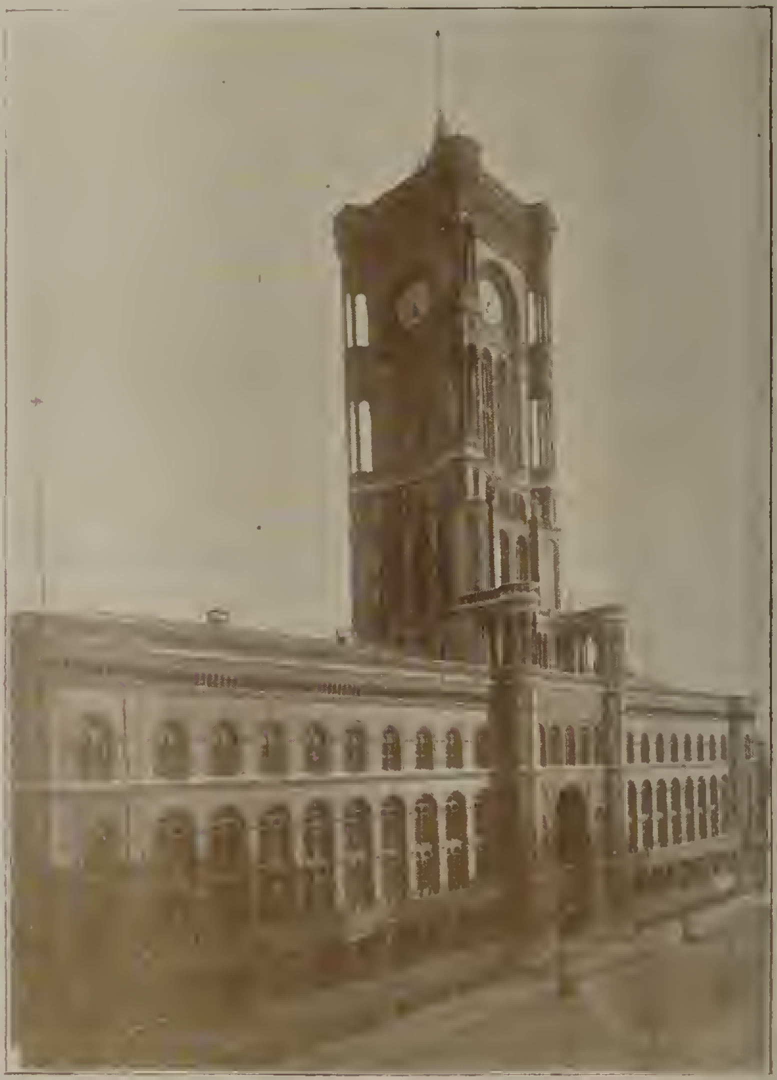
MR. A. KOPPEL'S OFFICES.



CHURCH OF THE HOLY CROSS (BRICK STRUCTURE).



THE PARLIAMENT HOUSE.



THE CITY HALL (BRICK STRUCTURE).

BERLIN.

party, who enjoyed an excellent lunch provided at the hotel, a glimpse of which building may be obtained from the photograph. After luncheon the atmosphere cleared somewhat, and the return journey was made by steamer, Cologne being reached in time for dinner.

The following day (Tuesday) was spent in travelling to the capital, which was reached at 7.30 p.m. Mr. Arthur Koppel and some of his staff were waiting to give us a welcome, and accompanied us to the Central Hotel, where we arranged to give a dinner in honour of Mr. Koppel and his staff. Dr. Martin Waldeck, correspondent of the *Standard*, was also present. After an excellently served dinner, Mr. Montgomery, in proposing the toast of the evening, asked Mr. Arthur Koppel to accept, in the name of the party, a silver cigar box, which he had brought with him from England as a memento of their visit to the fatherland, which Mr. Koppel had done so much to make enjoyable. The secret had been well kept, and the presentation took our guest very much by surprise, and undoubtedly afforded him the greatest pleasure. It is hardly necessary to say that this—the first time the party had had opportunity of meeting their generous host face to face—was taken every advantage of, and Mr. Koppel was, with great enthusiam, duly enrolled in the clayworkers' list of "jolly good fellows."

THE ROYAL ART GALLERY.

A GREAT DAY'S OUTING.

Wednesday was, perhaps, of all days the most enjoyable, crowded as it was with sightseeing. We spent the morning looking round Berlin, and the fifteen smart pair-horse carriages caused some sensation as they made a tour of the principal thoroughfares of the capital. A call was made at the Art Gallery and at the Museum of Arms, after which we took train for Potsdam, where luncheon was served at the Lake Restaurant, overlooking the water. The weather grew warmer as the day advanced and the subsequent drive around Potsdam was made under the most pleasant conditions. The famous Sans-Souci, sacred to the memory of Frederick the Great and of Voltaire, and its surroundings were visited. An hour was afterwards spent by the roadside, commingling with the crowd, in the hope of seeing the Emperor. We had to be content, however, in cheering the Empress and her sons, whom we saw on their way to a battle of flowers. This we took the liberty of watching from our conveyances, lined up within sight of the Corso. It is said that the onlooker sees most of the game, and we very nearly enjoyed the mimic battle as much as did the actual combatants, although we were just right at the time for a little "divarshun" of the kind could we have got it.

The afternoon was brilliantly sunny, and the light costumes of the ladies and the gay scarlet of the officers gave an effective touch to a flower battle that Nice, with its vulgar pushing crowds, can never hope to see. And what beautiful women were there, what well set up men! The sight pleased everyone and fully atoned for an hour's delay on reaching the landing stage, where a special launch was lying off ready to take us to Wansee. A delightful trip that was, amidst most diversified scenery, reminding one now of the upper reaches of the Thames, and now of the Lake District. After nearly running down a launch which, owing to some misunderstanding, tried to cross our bows, a pretty incident occurred. A charming English young lady, recognising (among the Lancashire contingent) some of her own noble race, shouted out, "God bless Victoria" (it was the Queen's birthday), and immediately the most deafening cheers arose, which must have surprised everyone but the English lady herself. Some irrepressible struck up "For she's a jolly good fellow," and we all felt a bit jollier and a bit more loyal.

CASTLE SANS-SOUCI.—THE TERRACE.

Wansee reached, a most excellent dinner was served in the grounds of the hotel, after which we ferried across the river and took train again for Berlin.

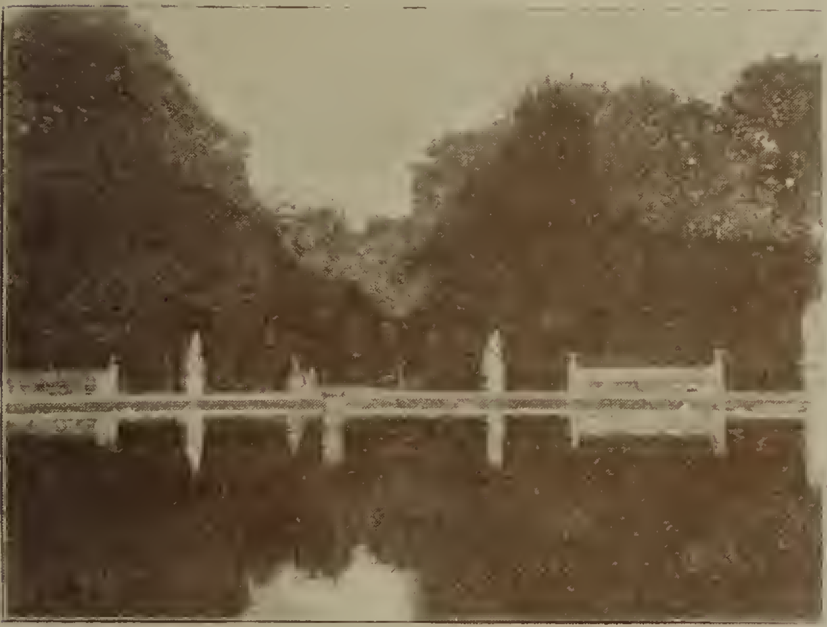
CLAUSDORF BRICKWORKS.

After Wednesday's surfeit of pleasure a brickyard excursion did not take on with more than half of the party, albeit a special train for 60 had been chartered on the Military Railway. The railway is controlled and worked entirely by the military, and is very interesting if only from the fact that here the German Army receives its education in railway affairs. Hence, when occasion arises, there is no lack of staff in railway manœuvres, from the engineer-in-chief to the plate-layer and humble porter.

Clausdorf possesses numerous brickworks, and the bricks are exclusively hand made. The two largest establishments belong to Messrs. Maass & Fasskessel and Herr Franz Arndt, and these were visited. The two photographs given show Herr Arndt's Brickworks, concerning which some particulars will be interesting.

By means of two Hoffmann kilns 14,000,000 bricks are made annually. The kilns are cylindrical, one having twenty chambers, the other sixteen. The bricks are made by hand on fourteen portable tables. The daily production per table is about 7,500 bricks, total 105,000 bricks. The season lasts from April to middle of September, *i.e.*, about 135 working days.

COURTS OF JUSTICE, BERLIN (BRICK STRUCTURE).



SANS-SOUCI.—THE LAKE.

SANS-SOUCI.—THE GARDENS.

SANS-SOUCI.—THE GARDENS.

SANS-SOUCI.—THE ORANGERY.

ON THE HAVEL.

The clay is got from ground lying on a slightly higher level than the works, and is throughout easy to work. One morgen of clay (about 2,750 square yards) costs about £150. As the depth of the clay is about 23 feet, this is equal to about 1½d. per cubic yard. About 106 cubic yards of clay are dug per day.

Clay and sand require for transmission some seventy tipping wagons; besides these fifty special wagons are in use, viz.: the portable brickmaking tables above referred to, and trollies for green and burnt bricks. The light lines on which the wagons and trollies are conveyed have a total length of about one-and a-half miles, and are supplied by the firm of Arthur Koppel.

Power for driving the plant is produced by one twenty-five horse-power horizontal steam engine, which drives three pug mills and two wash mills; one forty-five horse-power portable engine drives three pug mills and two wash mills; one sixty horse-power portable engine drives a large wash mill, four pug mills and one elevator. The transmission is made by means of wire ropes. Per ten hours working day the consumption of fuel for all three engines is about three tons of lignite, for burning 1,000 bricks three cwt. of lignite is required.

The cost per ton of coal is 14s., delivered on the brickworks. The following wages are paid during the summer:—

Strikers and furnace men, about 24s.
Men conveying bricks, about 17s. to 18s.

BRICKWORKS, CLAUSDORF.

In the winter the wages are 14s. to 15s. All wages are stated per week of six working days. The bricks cost per 1,000 from 13s. to 14s., and the present selling price at Clausdorf is about 24s. per 1,000 bricks.

The brickworks of Maass & Fasskessel possesses two Hoffmann kilns of twenty chambers each. The annual production is about 12,000,000 bricks. The working conditions in all the yards are similar to those described above. The total annual production at Clausdorf amounts to about 50,000,000 bricks.

CHARLOTTENBURG.

After the visit to the brickworks the party returned to the Central Hotel to luncheon, and afterwards, by special permission, visited the Royal Porcelain Factory at Charlottenburg, where they were courteously received and conducted through the building by Herr Heinecke, Director. We regret that lack of space prevents our describing this interesting factory, but we hope to refer to it in a future issue.

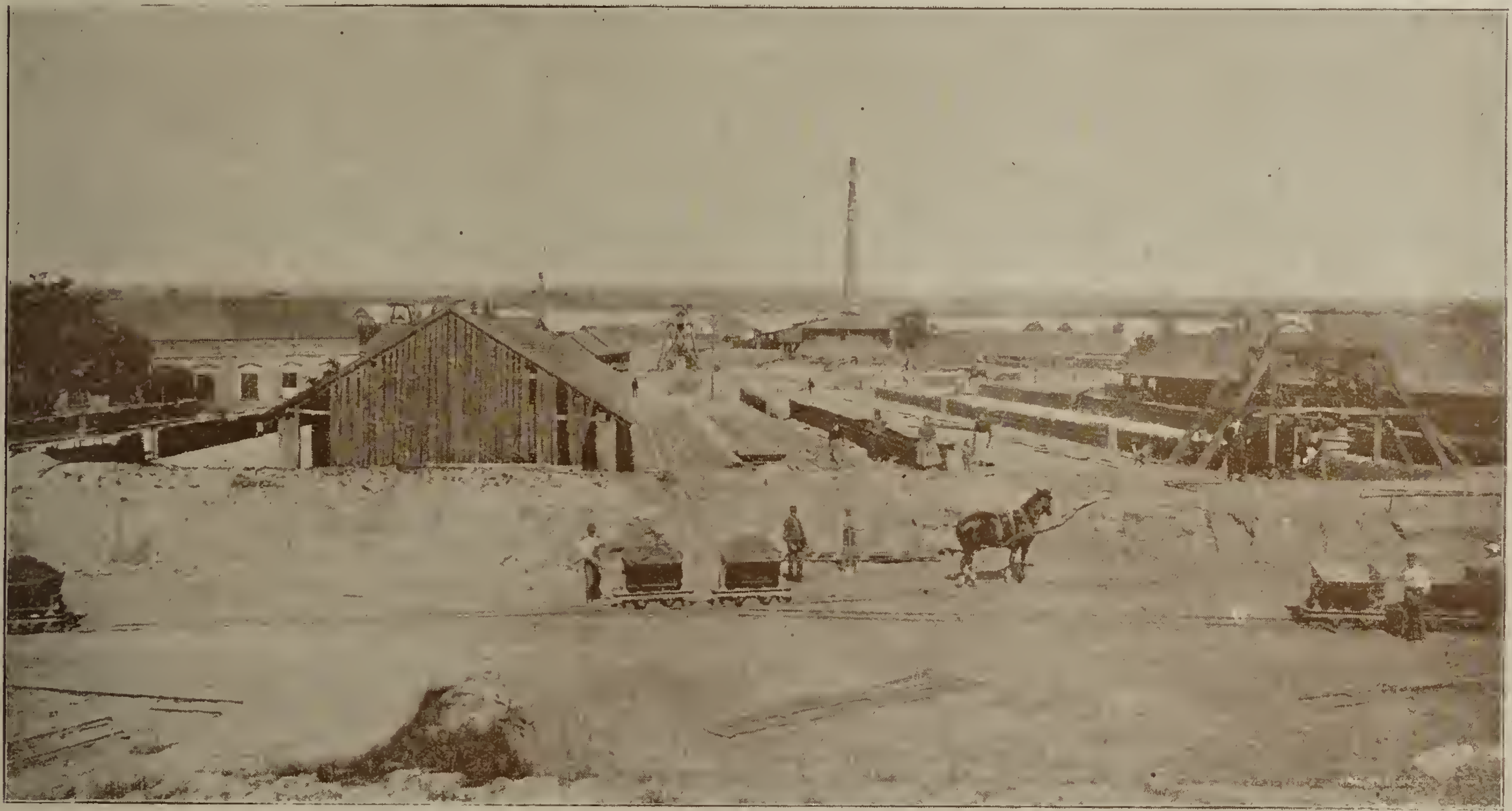
From Charlottenburg the party made for the Zoological Gardens, where the

FINAL DINNER

had been arranged for. Here a distinguished company foregathered to do honour to the party, including representatives of the *Times*, *Telegraph* and *Standard* in Berlin; Dr. Landau from the Berlin press; Dr. Hecht, representing the German Institute of Clayworkers; Herr K. Dümmler, who was charged with a message from Mr. Hoffmann, the inventor of the famous kiln; and a number of others, including Mr. Arthur Koppel, and several of his staff. Space alone prevents our publishing a full account of this function, which gave a brilliant wind-up to a most successful tour. The dinner was excellent, the party were in the best of spirits, the speeches were short and pithy, the enthusiasm was unbounded, and the loyalty unquestionable.

Mr. E. P. Collier, J.P., made an excellent chairman, and gave as the first loyal toast "The Kaiser." Mr. Bashford, of the *Daily Telegraph*, gave "The Queen," and told a charming story of Her Majesty. Mr. J. A. Herbert, J.P., talked eloquently of "Our Guests." Herr Dümmler spoke flatteringly for Mr. Hoffmann and himself of "British Clayworkers." Mr. Cunliffe gave "The Clayworkers of Germany," and eulogised their bricks. Dr. Hecht gave "The Clayworkers of Britain," and eulogised their bricks in turn. Mr. Courtis gave "The Press" a squeeze, to which Dr. Waldeck of *The Standard* genially responded. Mr. Montgomery gave "Mr. Koppel (and his indefatigable staff)," who in reply reiterated his thanks for the gift from British friends, and emphasised the fact that in whatever part of the world he went where English is spoken, he always received hospitality.

A rousing speech praising German hospitality and German men and women generally was made by Mr. Higson, and brought forth rounds of cheers. The party then joined hands and lustily sang "Auld Lang Syne." What the large assemblage of people gathered outside the Pavilion thought of the proceedings we cannot venture to guess; our being in the "Zoo" may likely enough have given rise to much conjecture.



BRICKWORKS, CLAUSDORF.

MEMENTOES OF THE BERLIN TRIP, 1899.

Just before the party broke up Mr. Cunliffe, on behalf of those present, handed to Mr. Noetzel a silver cigarette case, as a slight memento of his kind services as *cicerone*. A similar gift had also been purchased for Mr. Lempriere, who left the party at Cologne. On the homeward journey Mr. Collier asked Mr. Montgomery to accept from the party a memento of the visit, to take suitable form on arrival in London. Subsequently a silver bowl was purchased bearing the following inscription :—

> To H. GREVILLE MONTGOMERY, Esq.,
> From 58 British Clayworkers, as a memento of the
> Berlin trip, 1899.
> "Remember Bochum."

SATURDAY MORNING.
ALL THAT WAS LEFT OF THEM.

THE MANUFACTURE OF MAJOLICA.

No. V.

Slips and Glazes.

The possible processes of the decoration of bricks are only limited by the cost compared with the market value. As a rule it can only be confined to the mere dipping the faces in a transparent glaze. The cost of opaque glaze made of oxide of tin is too great to allow its extensive use. It is true that it is possible to obtain opacity without tin by introducing lime. This method, however, is open to objections as it is liable to cause heavy loss unless the kiln is carefully fired.

When using transparent glaze, the colour of the material itself is of much importance. Unless the clay is thoroughly mixed the irregularity of colour shows through the glaze, causing an unsightly appearance.

It will be obvious also that the true tint of coloured glazes can only be maintained when dipped on white clay. All coloured clays such as buff, red and grey must of course have a considerable effect on the colour of the glaze placed over them. It is, however, possible to avoid this objection by first dipping the face of the brick in a white slip or body. In this way effects can be produced which in all ways are equal to those upon solid white bricks.

A considerable variety may also be obtained by using coloured slips instead of white, these being again covered with various coloured glazes, or with a transparent colourless glaze.

Here it is important to notice the effect of different coloured slips when seen through the various coloured glazes, as these do not by any means produce the results which might be expected. On a black or brown ground, all coloured glazes will appear nearly black; on a yellow or grey ground all green and blue glazes will turn towards black, and a yellow glaze will become darker. On a red ground a green or blue glaze will also appear black. Under these circumstances it is very clear that on coloured bodies it is impossible to obtain an actual match of any desired tint.

Instead of dipping the bricks in slips it is also possible to sponge the different colours upon the face of the brick in such a way that they are mingled together, and with a certain amount of practice very many satisfactory results may be obtained.

It need hardly be pointed out that considerable care must be given to providing such slips as will shrink equally with the body in the firing of the biscuit, and also hold upon the brick without lifting or shelling in the drying.

Bricks which are made of calcareous earths, require a composition of slip very different from those which are more aluminous. It is also necessary that the slip itself should be in harmony with the composition of the brick upon which it is placed, as well as the glaze which covers it. In most cases much greater brilliancy can be obtained by glazing upon the brick that has been slipped. The closer the body of the clay, the more vitreous the material, and the brighter the texture of the glaze after firing.

Some attempts have been made to avoid the firing of the bricks twice, but the difficulties of carrying out such a process are considerable. As a rule the material is so porous that it absorbs moisture from the glaze mixture with too great rapidity, causing cracks and unsoundness of surface. The adoption of other decorative methods such as stencils, transfers and other simple appliances will be referred to in the chapter on decoration. It is only here necessary to point out that only the most simple processes are possible and such as do not interfere with the accepted dimensions of the brick itself.

Coloured slips may be produced either from natural clays or by artificial manufactures. Many clays, rich in metallic oxides, exist, which need only to be mixed with water and carefully sifted with the clay, or can even be used alone with admirable effect.

Yellow and red ochres, amber, buff and red clays can be used in this way. Considerable care, however, is required in firing all clays containing any large proportion of iron oxides, owing to the very great variety of tints which result from variation of temperature on this material.

Artificially coloured slips may be prepared by grinding or fritting the colouring oxides with non-plastic materials such as quartz, sand or felspar, the whole being mixed with the white clay to give the necessary plasticity and adhesion.

G. TUCKER & SON,
LOUGHBOROUGH,
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SUPPLEMENT TO THE BRITISH CLAYWORKER.—JULY, 1899.

THE BRICKBUILDER.

NOTES BY F.R.I.B.A.

A New Fire-resisting Plaster.

THE Fire Brigade ought not to be wanted much longer. We have witnessed a large number of experiments with fireproof and fire-resisting plasters in our time, and each was supposed by its promoters to be better than the last. We have long since given up all idea of using anything like the superlative case with reference either to the experiments or to the plasters ; we are quite content to make a record of facts, which in these experiments usually speak for themselves. The latest experiment we witnessed in this direction was with "Rous' fire-resisting material." The composition of this appears to be a "deadly secret," unless the reader is content with such a vague description as a combination of chemicals mixed with lime and a vegetable fibre, whilst tungstate of soda is said to play an important part. Never mind, this is probably quite as accurate a description as with some other plasters in which the composition is given in detail—and just about as useful to the lay mind, which does not comprehend how they are mixed. On one occasion (not the present one) an enthusiastic promoter or inventor of a fireproof plaster replied to our query as to the composition of the substance by saying that he did not "care two straws about the composition. It's the mixin' what does it, you has to be as careful in the mixin' as you do with separatin' the heggs in making a homlet." We have had a great respect for fireproof plasters since that time. In the experiments with Rous' material, a small hut was erected, plastered with the material within, and covered by match-boarding without. At the appointed time a fire was ignited in the interior, and very soon the plaster began to crumble in places. At first this did not seem very promising, but even though the lathing could be seen in such places as the plaster had been it did not catch fire for some time, and, indeed, the walls generally did not become injured until the little building had been subjected to the fire for at least an hour. There can be no question, therefore, that the material is fire-resisting, and should find its place amongst the best plasters of the kind. It was also satisfactorily demonstrated that the material is a very bad conductor of heat—a very desirable property in fire-resisting materials. The experiments took place in a field near Willesden Green Station.

Terra-cotta Finials.

WE use the term terra-cotta here in its widest sense, premising that not one-half of the finials are actually made of terra-cotta. That does not materially affect our present criticism, however. We are specially concerned now with the terribly beautiful works of art now turned out from many yards, and which, alas, are perched too high up on the roof for the man-in-the-street to see. Go and look at them in the yards and at the depôts. There is no shirking of the canons of art here. Regard that monster in buff, with a little sickly-red stain on his coat here and there. Those marvellous jaws, the ears, eyes, wings, the scaly body and curly tail. What can it be? The foreman does not know, but he has sold a great many. We suggest reptilia, but the scales won't do ; the head and tail won't do for any of the lemuroid mammalia ; whilst the aves must be provided with feathers even though the earlier ones had teeth. The foreman can throw no light on the matter, but at length explains that an architect "made it up." Ah ! that accounts for it. It is not the representation of some animal we are looking at, it is only art. Our memory being revived we thought of the earlier works of Turner, and then passed on. The next finial that attracted our notice was a hybrid between the teeth of a gigantic saw and the upturned heel of a boot ; this was also thought to be artistic, according to our friend. Perhaps it was evolved from the Norman "dog-tooth" ornament the artist raves about. But we are wrong again, for this finial was a "fad of the master's," so the foreman said. The next finial was in Squeers' best form, for there was a pigmy horse, and underneath was inscribed A. HORSE. Owing to the full stop after the A we at first thought it was the maker's name, but the representation was really "too exquisite for anything." A series of finials arranged ridge-wise, to save space in the depôt, showed that, on occasion, his Satanic Majesty could balance himself on leaves of an impossible shape. Judging from the size of the stock of these finials we gathered that they did not "catch on." Luscious fruit—the pomegranate, with the leaf scars turned the wrong way ; vegetation—the lotus, garnished with the leaves of the fan palm ; a bantam finial, with only one eye—the other having been forgotten to be put in ; various representations, usually very faithful to art, but not to truth, of mustard pots, pepper pots, javelins with square heads ; representations of the Sirdar, Gordon, Salisbury, Gladstone and Beaconsfield are an unique series of faithful likenesses which form appropriate finials. After inspecting a very large number at different depôts, in exhibitions, and on the street, we have come to the conclusion that there is no end to these artistic finials, and the artist-architect ought to feel truly grateful for the finished manner in which they are turned out. But if a good many of them went on to the heap in the yard they would find the place best suited to them.

Linoleum Bricks.

WE have often noticed the very extraordinary ideas which prevail in some parts of France regarding building materials, but we think that the idea of using bricks made from linoleum "out-herods Herod" if we may be pardoned the expression. Nevertheless, there is an article in one of our French contemporaries by P. G. Fond in which the manufacture of these bricks is seriously described. Essentially their manufacture is as follows :—A mixture is prepared of ground cork, 125 parts, and hydraulic lime, 300 parts, with 25 parts of glue dissolved in 200 parts of water, the paste being then formed in a mould, and the surface of the brick coated with a paste consisting of 50 parts of cork powder and 80 parts of oxidised linseed oil. When dry, the brick is impregnated with a solution of glue, 5 parts ; Troyes white, 10 ; potassium bichromate, 1 ; and red or yellow ochre 5 parts, in 30 parts of water.

THE MANUFACTURE OF MAJOLICA.

No. VI.—ITS APPLICATION TO BRICKS.

The Successful Application of majolica glaze to bricks has been so fully demonstrated by the ancients that it needs no arguments in its favour. Indeed, it is a matter of some astonishment that it has in later times attracted so little attention on the part of the modern potter. Magnificent examples of such work are to be found in Assyria, Babylon and Egypt, and the specimens still extant show that the potters of those days had good control of their material, though there are indications that the inherent difficulties of production taxed their ingenuity equally in ancient times. It is true that the bricks were decorated at a low heat, and the absence of frost relieved the potter from the necessity of studying atmospheric influences, but the possibility of decorative treatment in all its variety of application has certainly been fully appreciated by the artists of those days.

The enormous development of the use of dust-made tiles has no doubt been one cause of the neglect of glazed bricks as a decorative material. It is also an objection from a technical point of view that the mass to be heated for the glazing of the single face is very much greater than in the case of tiles, and therefore more fuel is used. Notwithstanding this, there are certain constructional advantages in cases such as that of columns, dies and plinths, which should commend the use of these decorative glazed bricks to the architect.

A variety of methods may be adopted in the decoration of bricks with majolica glaze of which the following are the most important. The green hard bricks may be built up into the desired form and afterwards decorated as they stand. It has already been pointed out that while the jointing of brick construction is to be accepted in dealing with the ornament, it is quite possible to avoid undue reduction of the scale of the ornament by the modeller.

Many Good Effects may be obtained by building up the green hard bricks into the desired form and then applying the surface ornament over the whole face regardless of the jointing. After the decoration is complete, the joints may be carefully parted with a knife, and the bricks removed separately.

This system of working is applicable to almost all decorative methods. It is equally suitable for ornament in slips applied with stencil or with brush, or for "sgraffito" treatment. When the building up of the work requires to be fitted to a curved or irregular line, the advantage is still more apparent, as the bricks can be fitted to the template and cut back in clay to the required line, thus saving much risk in trowel cutting on the job.

While, however, the covering of large surfaces with relief or stencilling, or slip decoration is quite possible although still maintaining the brick bonding, it cannot be denied that the most legitimate use of decoration for Majolica Bricks is that which accepts the limit of brick dimensions as its foundation, the pattern repeating itself in every course or at regular recurring intervals. In this way most effective combinations can be made for dados, friezes, piers, &c., even with a very limited assortment of material.

The most useful types of treatment for Majolica Bricks are:—

(1) Intaglio.
(2) Stencil.
(3) Relief modelling.
(4) Surface texturing.
(5) Fluting, &c.

All of these may of course be combined to make up a complete design for the whole surface.

The Care of the Glaze for Majolica Bricks is a matter requiring close attention. The bricks are placed on edge on the top of each other in the Glazed Muffle in order to save space. If set face upward, each tier requires fired clay slabs for its support, and the room thus occupied is nearly double. On the other hand, if set on edge, the glaze is very liable to run down to the lower part of the brick. For this reason each tier of bricks must be supported on placing pins, which prevent the edges from touching. The tendency of glazes to run offers grave objection in the case of some compositions. It is therefore obvious that a glaze which holds its position throughout is very desirable for this class of work. To obtain it should be the first consideration of the glazed brick maker. It will be found, as a rule, that opaque glazes are less liable to this fault than transparent ones, but some of the latter are much more viscid than others, and these hold up in their places much better.

The fault of running does not entirely depend upon the glaze itself. It is affected very much by the kiln construction, and by the method of firing. It is of the utmost importance with glazes of this type, that the firing should be completed as rapidly as possible, and that the heat should be checked suddenly and completely as soon as the proper temperature has been attained. The kilns should, therefore, be constructed with thin walls, which will allow the heat to pass very quickly, and also facilitate the cooling off when finished.

The closer the bricks are set together, the slower will the heat penetrate the mass, and the less slowly the heat can be checked, so that this point also has a certain part in the result. This objection, however, may be partially overcome by giving more space to the bricks in the kiln.

The Uses to which Majolica Bricks may be put are very varied, though they are of course more limited than those of hard glazed bricks. The latter are usually made of refractory clays, and the glazes are fired at a very high temperature so that they are very durable, though the range of colour is more limited than in the case of Majolicas.

It must, however, be remembered that there are many clays which will make a good close durable brick at moderate heat which would not stand the heat required for the hard glazes above referred to, and for such bodies Majolica Glazes are admirably adapted. It is true the glazes are not so hard, and therefore cannot be used where these are subject to heavy wear and tear, but in all other respects they can be used in most positions where the hard glazed bricks are now adopted. For corridors, sub-ways, and all internal walls which are not exposed to heavy frost, such bricks can be adopted with equal advantage, and will be generally found smoother in texture so that they do not catch the dirt as readily.

For the construction of fire-places and mantel-pieces, these Majolica Bricks are finding increasing favour with architects, and by judicious consideration of special splay and arch bricks many admirable pieces of construction can be arranged, well adapted to some styles of interiors.

For many designs the usual dimensions of brick are suitable, but very effective arrangements can be obtained by reducing the brick dimensions while still keeping the same proportions of general form.

Many other opportunities for the use of such material will readily suggest themselves ; indeed, it may be considered that the supply of a good decorative material such as is now under consideration creates its own demand.

NO. VII.—DECORATIVE METHODS.

THE METHODS OF DECORATION specially applicable to majolica for architectural purposes consist chiefly of the following processes :—

1.—The colouring of the surface to be glazed.
2.—The colouring of the glaze which is applied.
3.—The decorative manipulation of the glaze.
4.—The relief modelling of the surface.
5.—The intaglio decoration.
6.—The application of stencil in coloured slips.
7.—Intaglio of parti-coloured clays, as in the case of encaustic tiles.
8.—Sgraffito, or incised decoration cut throught a light slip ground into a dark body, or *vice versa*.
9.—Relief decoration in slip by means of a brush or stylographic tool.

Referring to the processes above mentioned, the precautions necessary with regard to the colouring of the surface and of the glaze have already been dealt with. The decorative manipulation of the glaze may be carried out by various means. For instance, it is possible to apply an opaque glaze or one of different colour by means of a sponge upon the surface of the ware, and afterwards to dip or coat the same surface with another colour, thus giving a broken or clouded effect which is often very interesting.

It may here be noted that the richness of tone is greatly enhanced by the breaking up of the colour in this and similar ways. Some very successful results have been obtained by the breaking up of the surface of the tile itself irregularly, giving a character of a rock cleavage, so that when the coloured glaze falls into the deeper parts increased intensity is obtained.

In processes as that of marbling or blending of two glazes different in colour, the one is dipped upon the surface of the tile, the other being flecked or traced over the surface in various ways with the pencil.

The third means is that of "dusting," the first tint being dipped upon the surface of the tile, the second being dusted dry through a stencil or slightly scattered over the whole surface.

A further modification of this treatment can be obtained by pencilling the second colour through a metal stencil of any desired pattern, or spraying the colour by means of compressed air. It will of course be noticed that all these methods assume a certain blending and mingling of the glazes together. It will be found difficult to obtain definition by these means, and, if it is intended to obtain sharpness of design, the application of the stencil should be upon the surface of the ware in coloured slips instead of in the glaze. The use of stencils is comparitively simple upon flat surfaces of tiles or bricks, but becomes difficult on the rounded surfaces of vases and pottery. In these cases the transfer method is much more practicable.

THE USE OF INTAGLIO is specially applicable to tiles, particularly when facilities exist for firing these accurately horizontal, so that the glaze flows equally into all parts of the design. Some clever examples are to be seen in which the intaglio design, though extremely shallow, produced an excellent effect, owing to the care with which the depth was graduated. If, on the other hand, the intaglio design is impressed to an equal depth over every part of the ornament, and this hollow is afterward filled with clay slip of different tint, the surface of the tile or brick being finally scraped level, the well-known encaustic tile is the result.

The chief objection to this method is that the design necessarily appears hard in character, and it is probably for this reason that of late years the public taste has favoured the richer glazes with broken surfaces, and softer gradation of ornament, in preference to the encaustic method.

The sgraffito, or incised decoration, needs the use of handwork, and is therefore in most cases too costly for use in the manufacture of tiles and bricks. It has been largely and successfully applied in the decoration of vases and art pottery, the ware itself being dipped in slips of various colours over a white ground or any light coloured slips over a dark ground, and the design cut or scraped through into the body of the ware, thus giving a contrast colour to the ornament. The ware may then be dipped in coloured glaze, or any blended glazes, or the design may be picked out in various coloured glazes, or any under-glazed colours.

A FURTHER PROCESS applicable also to pottery rather than to tiles is that of relief decoration, variously termed "Engobe" or "Impasto." This is usually accomplished by the use of the brush loaded with slip, either white or coloured. The objection attaching to its use rests in the fact that only a limited amount of slip can be carried on the brush, and it is therefore difficult to produce steady lines or broad fields of colour. Neither can a great amount of relief be obtained. Various stylographs and other tools have been suggested to overcome this difficulty, and some of these have certainly worked with considerable success.

Of the above methods several can of course be combined with good effect. Thus, stencilling in coloured slips may be produced upon a coloured body of different tone, and the surface may be further covered with a coloured transparent glaze.

IN MAJOLICA RELIEF TILES also, some very clever and artistic effects are obtained by the filling of some portion of the relief ornament with another coloured clay in the dye and filling up the box with a dark coloured clay to form the tile itself. By this means the high lights of the ornament not only become emphasised but appear through the coloured glaze differently tinted from the background.

DEATH OF PROFESSOR BANISTER FLETCHER.

WE deeply regret to record the death of Professor Banister Fletcher, F.R.I.B.A., which occurred recently in London. Professor Fletcher was a well-known man, and at the time of his death held many public appointments. He was Professor of Architecture at King's College, ex-chairman of the Sanitary Committee of the City of London, past master of the Carpenters' Company, and an ex-M.P. Since 1875 he acted as District Surveyor for West Kensington, and was a surveyor to the Board of Trade, besides holding other offices. For several years he rendered signal service to the Building Trades Exhibitions in London, as chairman of the Consultative Council of Architects. He was only prevented from taking part in the last exhibition on account of ill-health. He was a prolific writer, and for many years past had been in partnership with his two sons at New Bridge Street.

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SUPPLEMENT TO THE BRITISH CLAYWORKER.—AUGUST, 1899.

THE BRICKBUILDER.

POTTERY AS A HISTORICAL DOCUMENT.*

AND SOME REMARKS ON ITS PRESENT-DAY ADAPTATIONS.

When I was invited to open this exhibition I was asked to deliver an address on the history of pottery. Although I had at hand, to help me, the late Professor Middleton's admirable article on "Pottery" in the "Encyclopædia Britannica," and Messrs. Sparkes and Sandys's recently published volume on "Potters: their Arts and Crafts," that was rather an unmanageable subject to deal with in about twenty minutes, and what I have determined to do is, before dealing with the present position and future prospects of the potting industry in Staffordshire, to say a few words on the overwhelming magnitude of the debt of the whole civilised world to the potter's craft, in providing us with the very earliest, the most continuous, the fullest, and the most authentic of the contemporary records that have come down to us from "the dark, backward, and abysm of time" of all the historical states of antiquity. Pottery was the oldest and most enduring of the arts, and with basket-making and weaving, marks in every country the first dawnings of civilisation. All the initial civilisations have arisen in great river basins, such as the basins of the Ganges, the Tigris and Euphrates, and the Nile; and this has been due not only to the supply of water for irrigation, but of clay for potting.

Chaldæa, later known as Babylonia, was architecturally and artistically, if not also commercially and politically, entirely a creation of the potter. Juvenal (x. 171) says that, "Babylon was a city protected by potters;" Ovid (Met. iv. 58) that, "Semiramis raised up the proud walls of Babylon with baked bricks," and Ezekiel (xxiii. 14), that, "men [were] portrayed upon the walls of the palaces of Babylon, the images of the Chaldeans portrayed with vermilion." The modern excavations of Layard at Ninevah and Babylon, and of Dieulafoy at Susa, have confirmed these literary references to the immemorial tradition of the prodigious production of bricks and other fictile wares in Babylonia, and of the perfection there attained in the decoration of public buildings with tiles, and large slabs graven, or encrusted or moulded with illustrations of current events, and painted over in enamel with the most brilliant colours. But the most remarkable creations of the potter's craft in the valley of the Tigris and Euphrates are the tablets, inscribed in cuneiform characters with the chronicles of the rulers of Assyria and Babylonia, and with the religious conceptions and beliefs, and the memoranda of the daily lives and business transactions of their people. The record tablets of Assyria provide an unbroken and minutely-detailed chronicle of the declining decades of the Old Empire, and of the whole period of the New Empire to its confused close, that is, from B.C. 900 to 667. For Babylonia the chronicle texts reach continuously back from the sixth century B.C. to beyond King Khammarubi, who first brought all Babylonia under one rule, B.C. 2376-33. But casual tablets carry us far beyond the latter date. A cylinder of Nabonidas, B.C. 556, assigns to a predecessor, Naraim Sin, a date of 3,255 years before his own, i.e., the date of B.C. 3755. At first this abysmal date was received with natural scepticism; but some years ago an American exploring expedition unearthed at Nippur, at a depth of 30 ft. below the surface of the soil, the platform of a temple, all the bricks of which were inscribed with the names of Naraim Sin and his father Sargon I.; while below this platform they excavated the debris of older buildings down to the depth of another 30 ft., the inference being that the oldest buildings constructed on the spot cannot be assigned a later date than B.C. 7000. At all events the pottery of Babylonia affords conclusive evidence of the actual beginnings of art and artistic culture in Mesopotamia centuries anterior to B.C. 4000. But not only the whole chronicle history, but the whole religious literature of the Babylonians has come down to us indelibly scriptured on these imperishable burnt tablets, of which almost every city, the ruins of which have so far been explored, appears to have possessed an edition of its own.

POTTERY IN EGYPT.

Pottery in Egypt goes back to as primæval a period as in Chaldæa, and at a very early date reached the highest perfection in the form of unglazed bricks, unglazed and glazed tiles, glazed scarabs, and other images of the gods, richly-enamelled plaques and painted vases. The pyramid builders of the fourth Egyptian Dynasty, B.C. 3751-98, were the contemporaries of Sargon I. and Naraim Sin in Chaldæa. Very beautiful also are some of the doorways, built up of enamelled tiles, of the tombs and temples of the nineteenth Egyptian Dynasty, in the thirteenth and fourteenth centuries B.C.; and very valuable in many ways was the Egyptian fashion of representing in their vase paintings every type of the human races known to them, with the details of the clothing and jewellery worn by them and of the arms they carried. In this respect we are indeed under as deep an obligation to the Egyptian potter as to the Assyrian sculptors of the so-called "Ninevah marbles." But the history of Egypt was never intentionally recorded in pottery, as was that of Babylonia, and we only become dependent on pottery for Egyptian history where the stone monuments of the country have disappeared, as in the Delta, and the only light we obtain from the vast mounds of broken tiles and vases that exist there is casual and disconnected. The earlier Egyptian dynasties ruled from capitals without the Delta, from Memphis (just at its apex) to Elephantine, throughout which prolonged tract the river Nile is huddled in on either side by rocky hills, precluding, therefore, any temptation to destroy the earlier monuments for the construction of later buildings. On the other hand, the twenty-sixth dynasty, founded by Psammetichus I. in the seventh century B.C., had its capital at Sais, well within the Delta, where nearly all the stone monuments set up by Psammetichus I., and Pharaoh Necho, and Pharaoh Hophra and their successors have been used as quarries for providing the Arab devastators of Egypt with materials for building the cities of Rosetta, Damietta and Cairo. On the other hand, the Delta being rich in clay, it became from a very early period a great centre and market of the potter's industry; and the site of the Greek colony founded at Naucratis during the reign of Psammetichus I. has been identified, and its internal economy and external trade and its whole history traced by means of the painted and lettered potsherds found among its ruins. This city, so rich in the remains of the fictile arts and crafts of the Greeks, is also deeply interesting to all Englishmen, as the first fruit of the Free-trade policy, initiated by Psammetichus I., of throwing Egypt open to foreign settlers. The similar policy adopted in the same seventh century B.C. by Nebuchadnezzar II. gave its first great impulse to the sea-borne traffic of Babylonia with Persia, Arabia, Western India, and the east coast of Africa; and this enlarged commercial intercourse between the countries of the Indian Ocean gradually joining hands across the isthmus of Suez, with the active mercantile enterprise pursued by the Greeks, in succession to the Phœnicians, along the coasts of the countries of the Mediterranean sea, at last that great historical trade was established between Southern Europe and Southern Asia which flourished almost uninterruptedly from the seventh century B.C. to the rise of the devastating Saracenic power in the seventh century A.D.

"GO-A-DUCKING PHŒNICIANS."

As the "go-a-ducking Phœnicians" were the first intermediaries in the trafficking between the peoples of the Mediterranean countries, and were later supplanted in this coasting trade by the "cogging Greeks," the latter were, until very recently, supposed to have received the first inspiration of their arts from Egypt and Anterior Asia, and one of the greatest services rendered by the potter to the history of art has been to prove within the present generation, that while Hellenic art certainly received certain impulses, and a variety of decorative motives, from both Mesopotamia and Egypt, there existed in Greece centuries before the Dorian invasion (circa B.C. 1100) a highly developed indigenous art, which in the traditions it provided of the close study of nature and of refined technical methods, laid the solid foundations of the Hellenic art of Greece as it began to assert its independent individuality between the eighth and seventh centuries, and reached its perfection in the fifth and fourth centuries B.C.; and that the influence of this pre-Hellenic art of Greece not only dominated the immigrant Hellenes, but asserted its influence over Europe, far beyond the limits of Greece, to the very shores of the Baltic Sea and the German Ocean.

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* Address delivered by Sir George Birdwood at Stoke-on-Trent.

In 1868 Schliemann made his marvellous discoveries in the prehistoric mound at Hissarlik in the Troad, and in the prehistoric ruins at and about Mycenæ in the Argolid. These discoveries included not only figurines, but all sorts of objects of art, of which the most sensational were, of course, the jewellery of elaborately wrought gold. Schliemann thought he had broken into the treasuries of Priam and Atreus, and laid bare the very bones of Agamemnon. But he had done something much more important in the elucidation of the history of European art, for his discoveries—confirmed as they were by the discovery of similar figurines at Ialysus in Rhodes, in the islands of Thera, Naxos and Paros, and throughout the Cyclades, in Cyprus, in the Mycenæan cemetery at Thebes, in the Temple of Apollo at Delphi, in the neighbourhood of Athens, and sporadically over all Greece—demonstrated that an indigenous civilisation, capable of the highest artistic achievements, had preceded the primitive Hellenic civilisation of Greece, and that in its beginnings it must have extended back to the very verge of the neolithic night of Europe; and that after it was suddenly blotted out by the Dorian invasion of Greece (circa B.C. 1100), the tradition of it still remained a living artistic force in Greece and irradiated the stories of the "Iliad" and the "Odyssey" with their after-glow. This Mycenæan or, as it is now called, Ægean art, culminated in the fifteenth century B.C., and was therefore contemporary with the later Pharaohs of the eighteenth and the earlier Pharaohs of the nineteenth Egyptian Dynasties. Its ornamentation is characteristically marine, and some of its conventional motives were conveyed, in the course of the prehistoric amber trade of Europe, into the countries of the Baltic Sea and German Ocean, where, centuries afterwards, they reappeared as "The Three Legs of Man" and "The Celtic Knot." The jewellery is, as already said, wrought with the utmost skill, while the pottery, in the best baked ware, is found fully developed in colour, glaze and varnish. In the "Iliad" and "Odyssey" many of the lesser objects of industrial art are mentioned as the work of the Phœnicians; but the nobler ones are ascribed to the gods—that is, to the forgotten and mythologised artists and artificers of "Mycenæ the Golden [Poluchrysos]." The "Iliad" and the "Odyssey" were, indeed, the only links between the Ægean art of prehistoric Greece and the Hellenic art of Phidias and Praxiteles, until the recent excavation of the Acropolis, below the debris of the buildings re-erected on the sacred hill after the destruction of Athens by the Persians, B.C. 520, led to the discovery of the immense collections of the remains of primitive Hellenic art that had lain there buried and undisturbed for over two millenniums. After this date there was a rapid evolution of Hellenic art, the chronology of which, from first to last, is always to be most clearly and fully traced in the fictile wares of the Greeks, that is in their painted vases, which, including many of the so-called Etruscan vases, also afford us the most complete descriptions we possess of the costume, manners, and customs, and whole social life, and also of the religion and mythology of the Greeks.

ITALIAN POTTERY.

Glancing at the native pottery of Italy, in so far as it throws any light on the ancient history of that country, I would briefly refer to the excavations of the terramarine village of Castellazzo di Fontenallato, where a rustic crematorium was found, having beside it a platform with a number of urns containing the ashes of the dead, arranged on it in a four-square order with dividing cross gangways, after the ground-plan of the villages of primitive Italian and all antique cities. This is one of the most pathetic and suggestive relics of primitive Europe. I will only add under this head that the remains of Roman pottery indicate to us more exactly than any of the literary records of even so comparatively late a date what were the real limits of the Roman Empire, so far as its intimate civilisation spread beyond the boundaries of Italy.

There was a vigorous native art in Britain before the Roman conquest of these remote fog-banked islands, an art of the nature-loving Ægean type, and undoubtedly indirectly inspired by the Ægean art of Mycenæ; but such was the predominant force of the Roman invasion on southern and south-western Great Britain that our indigenous rustic pottery was at once replaced by the so-called Samian ware, the fashion of which was imported, as Pliny tells us, from the islands of Samos into Etruria, and was afterwards imported by the Romans into whatever still savage countries they carried their ever-victorious standard. But our native industrial art found a timely and safe refuge in Scotland and Ireland, where the practice of them slowly developed those distinctive Celtic arts which, as Rome declined and at last fell, reissued from their reinvigorating retreats, and as modified by Byzantine (including so-called Saracenic) art, flourished for centuries over all western and northern Europe, and even reacted on the arts of Byzantium.

ADVANCE IN BRITISH POTTERY.

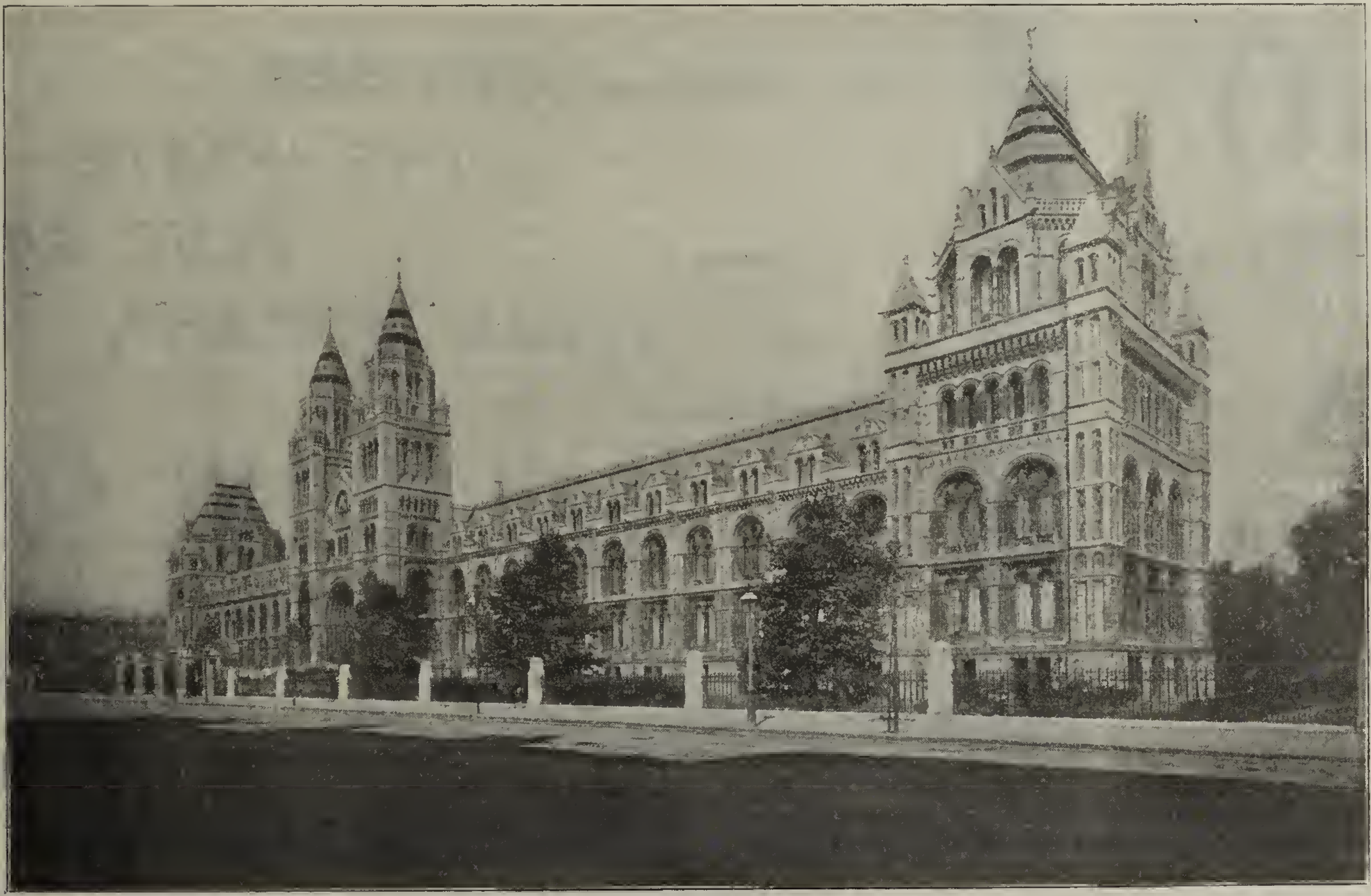
The advance made in British pottery during the past 15 years has been remarkable, and the improvement in its artistic quality since the Great Exhibition of 1851 has been truly wonderful. That exhibition gave an extraordinary impulse to all the artistic industries of the United Kingdom, excepting jewellery; and in none of these industries have the resulting effects been so beneficial and momentous as in pottery; the redeeming grace of our pottery, in all its numberless local variations, being the distinctively British love of nature, and of the study of nature in the harmonious combination of decorative forms and colouring, which can nowhere be artificially combined more felicitously than in pottery. Never was the pottery industry of this country more healthful and active than at the present time, there is before it an immediate future of unbounded prosperity. Its artistic superiority, in its simple naturalness and dexterous technique, over the pottery of all other European manufacturing countries, was being everywhere recognised, and the demand for all classes of British pottery was every year increasing in the United States and the other English-speaking nations of the New World and the Old. Apart from this, pottery was coming into growing demand for many purposes to which it had never before been generally applied in this country. The National Liberal Club in Whitehall Place, London, was an illustration of the pleasing effects to be obtained by covering the walls of ordinary living-rooms and house passages with enamelled tiles. In the Brompton Road, London, a house is now being completed the whole front of which is covered with enamelled tiles of deep-toned brown. Nothing can be more magical than the play of the slanting shafts of the light of sunrise and sunset on these tiles. The Birkbeck Bank in Southampton Buildings, off Holborn, London, is being entirely renewed in polychrome pottery, not only the ornamentation, but the entire architectural construction, so far as it appears externally, of the building being rendered in variously and vividly coloured enamelled terra-cotta. Of course, pottery readily yields itself to excess of elaboration in decorative details, and some will possibly feel that this has happened with the Birkbeck Bank, both in the plastic ornamentation and the colouring of the building, but none the less it is a hopeful illustration of what can easily be done to render the streets of London, and other smoky cities of the United Kingdom, as clean and bright and cheering in the future as at present they are dirty, dull, and depressing. The greater part of London and of Manchester might rapidly be rebuilt in enamelled terra-cotta, and with the finest effects of both foreground and distance, and with the most charming Flamboyance of softened colouring along the sky-lines. In Lambeth both scenic stoneware and earthenware are now being largely introduced in the internal decoration of public-houses. The tap-room of one of them has lately been lined with a polychrome representation of the Lambeth Bank of the Thames 100 years ago, showing the house as it then stood. Nothing could be more attractive. There is, of course, no limit to the potential demand for enamelled tiles and decorative stoneware for these and similar applications. The internal decoration of St. Paul's also at once suggests how profitable it would be for the potters of this country to take up the manufacture of earthenware and stoneware, if not of glass, mosaic cubes or "tesseræ," for the external and internal decoration of public and even private buildings. A great outcry has been raised against the decoration of St. Paul's with mosaic. The practical answer to it is to visit the cathedral as the work progresses, and I am glad to say that it is progressing without interruption, and to see it in the varying lights and shades of dewy morn and dusky eve and unclouded midday, Words cannot describe the stately splendour of the magnificent and enchanting vision that rises before you in the choir—divine in art of colour and design; and when the whole work is completed this achievement of the self-denying piety of the Dean and Chapter of the cathedral, and of the genius of Sir William Richmond, will be regarded in all future time as the crowning architectonic glory of Victorian reign. That the outcry against it should have received any semblance of official support is nothing short of a national scandal.

I have said nothing of the use of unglazed tiles and unglazed terra-cotta mouldings in house building and decoration. There are two highly ornamental chimney-pieces, of dull brick-red terra-cotta, almost as hard, to all appearance, as unpolished jasper, in the Council Reading-room of the India Office, which deserve more attention from architects and decorators than they have received; and the Science Schools at South Kensington, and the Natural History Gallery (British Museum), opposite to it, are two notable examples of buildings of unglazed terra-cotta. But the objection to its use in both these examples is that it is intentionally made to similate stone, with the result of painfully disillusioning the admiring of the noble architectural frontage of the latter building when once the imposition is exposed. The deception in this building is the more difficult of detection owing to the "bonding" of the terra-cotta blocks after the manner of stone masonry.

"BRIGHT, SHOWY TRINKETRY."

There is another application of pottery in the production of bright, showy trinketry. The Egyptians were great adepts in it, enhancing the brilliance of the variegated enamels used in the first firing by leaving depressed points on the surface of the objects (usually of a prophylactic, phalacterial or talismanic character), into which fragments of richly coloured glass were fixed and fused by a second firing. Gaily painted and carefully modelled in the minutest details, this dainty trinketry was, in design and subtlety of artifice, a triumph of the potter's craft, and, indeed, to say so without offence, of his craftiness. Stoke might do much in this way to cut out Birmingham, and there would be nothing of the tarnish of imitation —of "Brummagem"—about such jewellery.

To secure this future, the indispensable requirement was to advance in every way the technical and artistic education of the British potter. That is too large a subject to treat fully in bringing my remarks to a close. I will only say on the point that—it is as true of pottery as of all other artistic industries, it is indeed more true, as clay responds so readily to one's mental suggestions—that the skill of the artisan can be perfected only in the education—the drawing out—of his artistic ideals, and that two things are essential to this.


NATURAL HISTORY MUSEUM SOUTH KENSINGTON.

TWO ESSENTIALS OF SUCCESS.

The first is to intimately familiarise the potter with the best examples of his art, and above all, with the masterpieces of the Greek potters. One has to insist on this in an unhistorical age, in which men are apt, in their degrading ignorance of tradition, to rely too exclusively on their technical proficiency and overweening conceit of themselves. The second essential, and still greater thing, is fortunately innate in all the Aryan races and deeply implanted in the British races, and that is the simple love and diligent study of nature; the love of our green hills and dales, of the bright flowers of our fields and lanes, the birds that fill our rejoicing skies with song, and the shells and other strange sea things the surging waves wash up on our shores, the colours of sunrise and sunset, and the jewelled constellations of the midnight heavens.

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ILLUSTRATED CATALOGUE On APPLICATION

A Reference. By the kind permission of **The Ravenhead Sanitary Brick and Tile Co., St. Helen's, Lancashire,** the Apparatus may be seen at work, or reference made to them as to its capabilities.

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THE BRICKBUILDER.

NOTES BY F.R.I.B.A.

Interlocking Arch Bricks. We have recently had introduced to our notice a model illustrating Messrs. Grayson and Spratly's idea of what an improved Roman arch should be. In this it is suggested that the arch should be composed of a kind of dovetailed brick, which can be made of the usual materials of which divers kinds of bricks are made. The interlocking is so contrived that every brick becomes a sort of "key-stone." The patentees state that the interlocking may be achieved in a variety of ways, and the principle holds good not only for ornamental or other forms of arch, commonly constructed by the builder, but for "colossal viaducts and tunnels." So far so good, and we do not doubt for a single moment that all that is claimed for it in the modest type-written account of the contrivance which now lies before us, is right enough. The only difficulties presenting themselves to our mind are those which we are afraid would be encountered in actual practice. The architect or engineer designing an arch, does so with reference to the particular features of each case. If across a road, the width of the road is a governing factor as well as the sweep, and actual curve to be obtained. Thus these interlocking bricks would have to be shaped to suit such curves, which are, as we say, mostly of a variable quantity. Special bricks would appear to have to be made for particular arches. Of course, where the span of the arch was of a design, duplicated indefinitely as in railway arches and the like, such interlocking bricks might be made and numbered in any quantity, and it is for them perhaps that they would be principally used. Again, for culverts they would be very suitable, and, in fact, for arched construction in any form where permanent curves obtained.

"Blowing" in Bricks and Pipes. We have had two curious examples of "blowing" in bricks and drain pipes brought under our notice during the past month. In one, the pipe, which was about 4 inches external diameter, the clay was blown into an elongated pear-shaped cavity, lined with red ochreous substance which is no doubt the iron mineral limonite. The cavity was 5¼ inches in length and the amount of blow, the maximum diameter of the cavity, about 1¼ inches. The curious fact about this phenomenon is that all the blowing has resulted in bulging out in the interior, thus almost closing the pipe aperture. Several smaller "blows" occur in the same sample, and they all show the same phenomenon. It is not easy to account for this action becoming mostly manifested in the interior. The lines of least resistance appear to have been rather towards the exterior of the pipe, and the centre of the chief "blow" is much nearer the outside than the inside. Unfortunately, there is nothing left to tell us what occasioned the "blow," but it was probably iron pyrite. The brick mentioned had also a large cavity, and this was lined by hematite and limonite, the latter being stalactitic in habit. A careful study of the mineral lining the cavities of blows should teach us more concerning the "metallurgy" of brickmaking, and the two cases above cited are decidedly interesting.

A New Building Material. It may be perhaps eighteen months or two years ago since we first called attention to a new composite building material which had been discovered in France, and which presented in our opinion many points of interest. We do not commit ourselves to any opinion as to whether this new material is likely to "catch on" with builders and architects, but according to one of our foreign contemporaries it certainly is becoming very popular, especially in France, where it is being pursued on a large scale according to the process patented by Garchey. The raw material (bottle-glass and window-glass cullet) is crushed in a mill, sifted, and slowly heated for an hour in cast-iron moulds to devitrify the glass and convert it into a very viscid pasty mass, which is then heated for a few minutes in a furnace at 1,300 degrees C., and pressed by hydraulic power. According to the colour and fineness of the materials the appearance of various kinds of stone can be imitated. From official tests it appears that the glass stone, as it is called, will resist a pressure of 2,023 kilos. per square c.m., whereas granite will not stand more than 650 kilos. pressure. It also withstands the action of cold, sample plates cooled to twenty degrees below zero resisting a pressure of 2,028 kilos. per square c.m. In point of resistance to attrition the new product is found to be superior to St. Raphael porphyry, and twice as good as Comblanchien building stone. A 4·2 kilos. weight falling from a height of one metre effected the fracture of the blocks after twenty-two blows, whilst similar blocks made from blast furnace slag and Cherbourg quartzite were broken at the nineteenth blow. The tensile strength is 15·3 kilos., blocks measuring 50 × 33 c.m. requiring a force of 25,000 kilos. to tear them asunder. Among the advantages claimed for glass stone for building purposes are its non-porosity, insulating power, insusceptibility to atmospheric and other influences, cheapness and hardness, the latter being so great as to necessitate the tempering in mercury of the cutting tools used in working the stone. It is also suitable for street paving, being able to stand the vibration of traffic, easy to clean, and hygienic, whilst the pavement does not become slippery. We have no data regarding the price at which this new glass stone can be produced, and therefore are interested to see whether the introduction of this manufacture into this country would be commercially possible. It is difficult for us to believe, however, that this material could compete in price or in appearance with the beautiful terra-cotta facings which are now being so largely employed in buildings of importance. We grant that the material is probably quite impervious to atmospheric and other influences, and that it is probably very hard, but again, as a material for street paving, it is impossible to conceive that it can be better than bricks or even than those composite stones which are now meeting with so much support.

BRICKS BLUE, BLUED, AND BRINDLED.

SOME WORDS TO SURVEYORS.

We do not know whether the average borough surveyor has ever himself studied this question, but the way he acts when blue bricks are decided to be used on a particular paving job seems to show that if he ever has, he has not come to a satisfactory conclusion. It is quite safe to assert that the majority of surveyors do not understand what a real blue paving brick is. Dr. Johnson in his more facetious moods might have described the essential qualifications of a blue brick, as that first it should be a brick, and secondly that it should be blue. But, the term, as all makers know, has a more definite meaning than that, although many surveyors seem quite disposed to ignore the fact.

It is decided to use blue bricks. Tenders are advertised for, and the tenders and samples are duly sent in. The honest maker, quoting for real blue bricks, is speedily put out of court by one or two others who are enabled to quote at a lower price, as they are only intending to supply what we should call "blued bricks." The stock phrase, "the lowest tender will not necessarily be accepted," is not often acted upon in practice, and so the "blued bricks" gain the day.

We take it that a blue paving brick is one made from specially suitable earth, well burnt and, as near as may be, dark metallic-looking blue to the centre. A micro-examination shows that partial fusion has taken place throughout, and not merely at and near the surface. It may be of a semi-vitreous character, is hard and exceedingly tough. What we have called the "blued brick," on the other hand, is, although dark blue in colour at the surface, of various shades of brown, yellow, and even reddish in the interior. The half of one of these latter clearly shows that the burning has not been thorough, that fusion has only been satisfactorily promoted at and near the surface, and this more or less hardened skin, as it were, is made to do duty for the whole. The blued brick, although hard at the surface, is not usually so in the interior, and the whole lacks that most essential qualification for paving purposes, viz.: toughness.

If there is any one qualification a good paving-brick should possess over another, it is comparative non-porosity. A really good brick is, practically, non-porous, even if when broken in two the separate pieces are tested for porosity. On the other hand, the blued brick, which might keep out a certain amount of moisture through the medium of its hard skin surface, utterly fails when broken, the two separate pieces commonly being as porous as an ordinary building brick.

At first sight, this latter failure might not seem to be of much importance, seeing that in its entirety the brick is fairly non-porous,—but, such bricks do not wear well; the unequal expansion and contraction due to changes in temperature set up strains internally, owing to the want of homogeneous structure, and absence of uniform hardness throughout. In due time, the hardened skin is worn through, and the more porous interior is rapidly reached. Disintegration goes on apace, and a hole in the pavement is the inevitable result. The good and true blue brick, being the same throughout, does not succumb to these influences, and though, of course, the inevitable grind of traffic causes their uppermost surface to wear in time, there is still the main body of the brick to be got through; and, speaking generally, such bricks may be regarded as indestructible. They come to more harm by being repeatedly taken up, and carelessly re-laid, than by any other process, and then it is only at their corners, which, standing above the pavement-level, are liable to become chipped.

There can be no doubt that many surveyors use the inferior bricks, well knowing them to be such, on the score of cheapness. We have nothing to say to these gentlemen—they are beyond criticism.

The "blued bricks" may also be used owing to what the circus clown would call "sublunary influences," or to put it plainly, "jobbery." We do not mean on the part of the surveyor, but of his superiors. The free and independent electors of Mudborough may elect an individual to represent them on the town council, but the chances are that *he* may neither be free nor independent. He may partly depend, for instance, upon any subscription he may be able to extract from the "blued brick" owner if he can get an outlet for the latter's goods. Some of our readers may hold their hands up in pious horror at such "base insinuations," especially at the end of the century, now that we are all getting so good! Vested interests are always troublesome to get rid of, but invested interests are worse. By a process of arithmetic, combined with the well-known principle of "you scratch my back and I won't smack your face," with a desire to do to your neighbour what you would like him to do for you, may lead to the employment of more blued bricks than most people are aware of. Of course, we are not alluding to honourable councillors who are altogether too numerous to mention. The annoying part of all this to the "blued brickmaker" is that he may be, for the time being, the unconscious victim of the jobbery. He may make the "blued bricks" with the best intentions in the world and sell them as only second-rate blue bricks, which is honest enough, of course; we are only declaiming those who would sell such bricks as the best "blue paving bricks" in the sense in which that term is by custom used in the trade. That may sometimes be done by the independent agent, and the real maker may be unconscious of the transaction.

Another phase of the paving brick question is one we have never yet been able to understand. And that is, why those who want a really good paving brick should *insist* on its being of a blue colour. As we have seen, tint is properly associated with very good bricks, but all it conveys (leaving the blued brick out) is that it is well burnt, hard and tough. Now we go so far as to say that a good brindle, burnt as hard as can be, is quite as useful for paving as any blue brick can be. The brindle, moreover, is commonly rougher on the surface, a quality of some importance for pavements. A good brindle is quite as strong as, and frequently stronger than the best blue brick, and the only solution to the enigma appears to be either ignorance, or prejudice, or both. We should even defend the brindle from an æsthetic standpoint, for nothing can be more funereal in appearance than the always present deep blue-black material.

However, the main lesson for surveyors to take to heart is to learn the differences between the different kinds of blue brick, and then to ask themselves fairly, and without prejudice, why they always prefer that colour, and very rarely give the less-fortunate brindle a chance.

THE MANUFACTURE OF MAJOLICA.

No. VIII.—MATERIALS.

BESIDES the methods mentioned in our last issue, it is possible to cover the surface of the brick or tile with a white slip, and, after decorating, the design can be printed from a copper-plate transfer in under-glaze colours and glazed as in ordinary earthenware. This method, however, is confined to the glazing in hard glazes at the temperature of Seger cones Nos. 06 to 03, this temperature being higher than is usually applicable to majolica glazes, and therefore hardly to be included as available. Majolica glaze being so soft and liable to crazing at a second fire, any method of decoration by enamel or over-glaze is generally impossible, and can only be carried out in such glazes as will bear the higher temperature just referred to.

THE MATERIALS usually adopted for the manufacture of "true" Majolica (that is, such ware as was originally produced in Italy), have always included among them that of lime in some form, and it has been a tradition of the maker of Continental Majolica even up to the present time, that a considerable proportion of lime is necessary for the success of such wares, especially if the glaze is stanniferous.

In this respect the Majolicas of this country essentially differ from those manufactured abroad, the introduction of lime into the body being quite exceptional. The body naturally varies with the construction of the glazes, and must also be modified to suit them. The bodies in general use for Majolica and Faience in this country are compounded of ball clays mingled with ferruginous marls, or with finely ground fire-clays. In a few cases the ball clays or marls are used by themselves. The bodies which are compounded from these marls require also to be varied according to the method of formation, such as plastic, dust-pressed, moulded or thrown, in as much as these bodies are generally fired at a temperature sufficiently low to allow of considerable porosity after firing, and the glazes are often subject to crazing.

Majolica is not under these conditions altogether suitable for the production of vases, jugs, jardinières or other articles required to hold liquid. It is no doubt for these reasons that an attempt has been made of late years to adapt the Majolica methods of decoration to earthenware bodies, these being closer in texture and allowing of greater soundness in the glaze.

It has however been pointed out that this entails the raising of the temperature for glazing, and thus causes the sacrifice of many of the most interesting qualities belonging to this class of ware.

The preparation and compounding of bodies for Majolica wares may be divided into various sections, such as :—

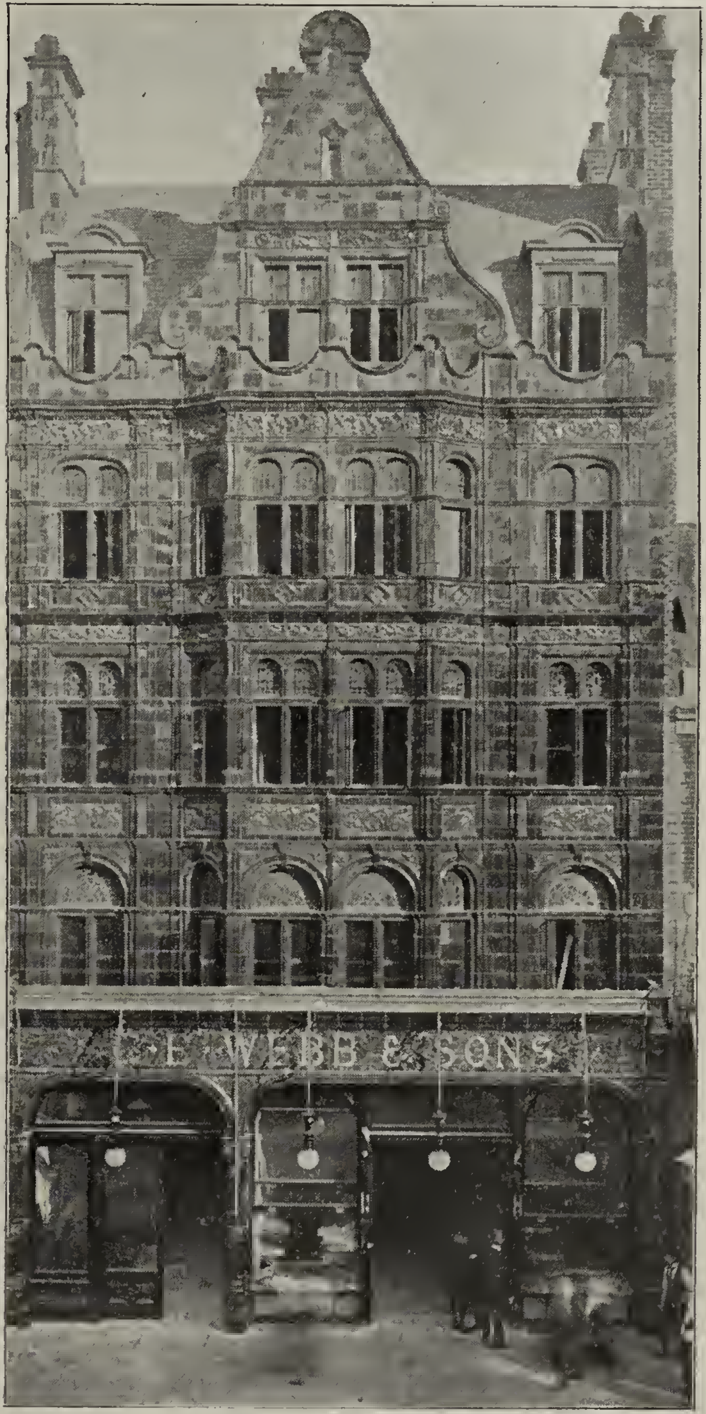
1. Bricks and Plastic Tiles.
2. Dust Tiles.
3. Thrown Ware.
4. Moulded Ware.
5. Architectural Enrichments.

All these require modifications in manufacture which it may be well to notice.

BRICKS.—The preparation of material for bricks differs in no material respect from that of ordinary glazed bricks. The chief precautions required are to avoid all irregularities of composition, to obtain a completely homogeneous mass, to remove as much as possible all extraneous matters—whether vegetable, calcareous, or ferruginous.

In the case of fire-clays which contain iron, it is important to have these ground and sifted fine, so that the iron particles may not be so perceptible.

In combining bodies for these Majolica Wares, it is difficult to obtain freedom from crazing when circumstances will not allow much margin in the adjustment of the body, because crazing in glazes of this construction cannot be easily corrected without reducing fusibility. As regards this fault, the best plan is to increase the quantity of refractory clay in the body—and, at the same time, to increase the temperature at which the biscuit ware is fired.



HOUSE IN BROMPTON ROAD,
FRONTED WITH BROWN ENAMELLED TILES
(as described in last issue).

The description of machines used for the preparation of clays for Majolica bricks and tiles, does not materially differ from that of other glazed bricks. The condition of the clay at the time of treatment will, in all cases, decide the type of machine likely to prove most efficient. Thus, if the clay is dealt with in the plastic state as it comes from the pit, and without being dried, the method of passing it through one or more pairs of horizontal rolls will probably be the best. From this stage it may be passed direct to the mixer, in which it can be tempered, and finally through the pug mill. The chief objection to this plan is that no sifting out of stones, grit, or foreign matter can take place. It is therefore only suited to clays uniform in texture and free from all impurity.

In dealing with clays liable to stones or gravel, the method of "slumming" or wet sifting must be resorted to. It is true that for coarse bodies intended for common bricks, the stones and gravel are sometimes crushed fine through rolls, together with the clay, but such a method is quite unsuitable for any body intended to take a glaze. Some clays are of too close and fat a nature to soak readily, and it is less trouble to grind in the dry state. In this instance some form of edge runners will be found more satisfactory. With this arrangement, two or more clays can be blended, and sand added if necessary, the ground clay being elevated and mixed with water in another set of runners, or in a mixer, and thus reduced to the plastic state.

Dust Tiles.—The preparation for materials for dust tiles is a matter requiring the closest attention. The use of majolica glazes for the decoration of wall tiles has now been so greatly extended, that much enterprise has been devoted to the manufacture; hence the quality of material demanded in order to insure a market is at the present time very high. Truth of form and surface can only be obtained by the utmost care in the grinding, sifting and mixing of the ingredients. It is true that with some clays and marls, it is possible to produce a very creditable result by the mere grinding and sifting of the natural clay, this being used in the form of dust for making the tiles. It is, however, impossible to obtain sufficient uniformity by the use of a single material for high-class work, and the blending of clays is therefore resorted to. It is desirable that all bodies for the production of dust tiles should be mixed in the wet state, and again dry ground and sifted to the necessary size of grain before using. Unless this is done, the various ingredients are not brought into intimate contact, and the clay is not homogeneous.

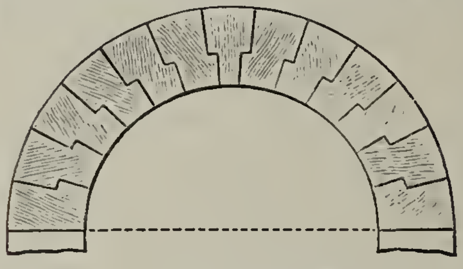
The compounding of bodies for this purpose is similar in many respects to that of ordinary earthenware; that is to say, the various materials being mixed with water in separate tanks or "arks," are mingled in the liquid state, and agitated together in a "blunger," being afterwards dried in a slip kiln, or consolidated in a clay press and finally dried over hot pipes or flues.

(*To be continued.*)

Business in Bulawayo.—Some idea of the extent of building operations in Bulawayo may be gathered from the fact that there are resident there 12 firms of architects, 41 of builders, 17 of bricklayers, 49 of carpenters, 5 cabinet makers, 53 of contractors, 3 decorators, 11 of masons, 7 of plumbers, and 20 painters.

The Alfreton Brick Company.—We are informed that Mr. C. H. Freestone, of Luton, has disposed of his interest in the Alfreton Brick Company to Mr. Valentine Hill, who will in future be the sole proprietor. The works will be carried on as heretofore under the style or firm of The Alfreton Brick Company. We also understand that Mr. Hill is about to develop another undertaking in the brick line in a rising part of Nottinghamshire and near to a large and growing district. We wish Mr. Valentine Hill continued success in his existing enterprise and if possible a greater success in the new one.

TO BRICKMAKERS.
SPECIAL.
A NEW ARCH BRICK



of which the block is a central section. Patentees desire to grant Licenses on Royalty of 20/- per thousand. Easily made from a simple matrix.
All Particulars from the Inventors:—
GRAYSON & SPRATLY, 32, BRIDGE ROAD, HAMMERSMITH, W.

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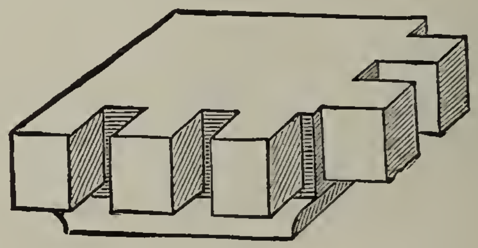
ST. PANCRAS, LONDON, N.W.
And LEICESTER.
WORKS, RED BANK, MEASHAM,
AND WOODVILLE, BURTON-ON-TRENT.



ORNAMENTAL BRICKS TO ARCHITECTS' DESIGNS
RED PRESSED AND SAND STOCKED FACINGS.

H. J. & C. MAJOR,
THE PATENT TILE WORKS,
BRIDGWATER,
Sole Manufacturers of Patent Waterproof Roofing Tiles that have gained Highest and only Awards in every Competition, and are cheaper and more efficient than Slates.
PARTICULARS FREE ON APPLICATION.

SUPPLEMENT TO THE BRITISH CLAYWORKER.—OCTOBER, 1899.

THE BRICKBUILDER.

NOTES BY F.R.I.B.A.

Decay of Brickwork under water. THE bacterium is credited with a great deal now-a-days, but we doubt whether anything important of a criminal nature has hitherto been attributed to him in reference to the decay of brickwork. There can be no doubt, however, that brickwork would often stand better under water if certain bacteria were not present. Unless water be chemically prepared, that bacterium known as the nitrifying organism will almost always be in the water. And, in presence of certain food upon which it exists, it produces either directly or indirectly nitrous acid. This acid is capable of attacking cement until the substance of the latter practically disappears. Thus, in setting bricks in cement, under water, it is almost impossible to defend the work from the depredations of these organisms. Then, again, bricks containing much iron, or calcium carbonate, may themselves be attacked at the same time. In fact, it has now been discovered that much of the work of disintegration of cement and brickwork under water (as in reservoirs and the like) hitherto attributed to the solvent action of carbonic acid, must now be transferred to the nitrifying organism and its nitrous acid. The transference will not make much difference to the brickmaker from a practical point of view, as he is so accustomed to provide very hard and non-porous bricks for reservoir work, and these are difficult subjects even to nitrous acid. At the same time, as little iron and calcareous material as possible must be allowed even in these bricks—to say nothing of the commoner kinds of brick employed for work under water in other than reservoir constructions. But, to the cement maker this discovery is of importance, and to the engineer it has its bearings on the life of brickwork in general under water. Presumably, engineers and surveyors will now be enquiring for cements which are proof against nitrous acid, and where are they?

Bricks for Public Baths. A LARGE question was incidentally broached in the discussion of a paper by Mr. Hessel Tiltman on "Public Baths and Wash-houses," read before the Public Health Congress at Blackpool the other day, which seems to show that architects who design those public buildings have yet something to learn from the clayworker. Mr. Ebbutt, of Acton, discussing the construction of the rain-douche bath, enquired what material was thought best for the margins of the ponds. Mr. Tiltman replied that it was a difficult matter to find a good material for gangways, but a stone which was non-slipping and of good colour was essential, and he thought that hard York stone was the best. There certainly seems to be a conflict of opinion here; at any rate, at a "Health Congress" one would hardly expect to find such material recommended for the purpose of public bath construction, especially for gangways. It is abundantly clear that in a public institution of that kind, the materials employed should, above all things, be non-porous. It is a common practice on the continent, which has now to some extent been introduced into our own public baths, that the coal heaver, the sweep, and others whose daily avocations are not of a very cleanly character shall first go into the douche bath, to remove the first coat so to speak, before entering the swimming bath. Or, in the case of first-class bathers, the douche shall be used as a preliminary refresher. To make the margins of these baths, or even the gangways, of anything but a non-porous material is distinctly unsanitary, to say nothing stronger. In our view a good, hard, non-porous brick, or broad non-porous clay-goods slabs, are the best for the purpose mentioned. Such materials may be readily purchased, and they can be made quite as non-slippery as any kind of York stone.

Cement Wash for the Protection of Ironwork. COATINGS or coverings of cement have been employed by certain railway companies in France for some years past to protect the metallic portions of bridges crossing their lines from the rapid destruction to which such parts are liable by reason of oxidation, through being continually exposed to the action of clouds of steam and gas, products of combustion escaping from the locomotives. Formerly the practice was to protect such structures as were most exposed to such deterioration, by providing sheet metal guards, in the form of reversed channels, secured to beams in a direction parallel to the lines, which guards were replaced as soon as they had become worn out. At present, however, ironwork in situations where it is exposed to the above deteriorating effects is usually protected by a coating of cement. A method of applying the cement which is used in Austria, and which is highly spoken of, consists in brushing down the ironwork with a heather broom, dampening it with a rag or whitewash brush, and afterwards applying two coats of Portland cement wash made rather thick, and having added to it a proportion of fine sharp sand. In Berlin a coating of mortar containing a third part of cement has likewise been successfully employed for preserving the parts of ironwork which are buried in the ground. At Zeebrugge, in Belgium, where a deep-water harbour is now in course of construction, a portion of the pier of 300 metres in length is being formed of open work, and the steel piles of this part are endued with a coating of semi-fluid cement mortar, applied by means of an apparatus worked by compressed air, the piles having been first subjected to a preliminary cleansing by means of a sand blast projected by the same apparatus.

Ceramic decoration. THE appropriateness of ceramic ware for external decoration is gradually being forced upon architects—as witness the tile facings which are being adopted in London. Messrs. Doulton have now in hand a more ambitious undertaking, viz., the manufacture of coloured panels for the exterior decoration of a Glasgow church. The experiment is a step in the right direction.

COLOUR.*

By H. C. Corlette, A.R.I.B.A.

Colour in Architecture.

There are three questions with which we are confronted when we wish, as architects, to have colour associated with the buildings we design. The first of these requires an answer which shall tell us how we shall satisfy this desire. The next asks us where may we legitimately introduce whatever we may decide to employ. But, perhaps, the most difficult of all is to decide upon the manner or method of treatment by which the decoration shall be done. This last consideration involves many things which each one must ultimately settle for himself. It asks what are the methods we shall follow, what media may be employed, how our decoration shall be introduced, the nature of drawing and design, and the qualities of colour that should be adopted as likely to be the most valuable in producing the effect we wish to see. And these are some of the leading points only which a lover of colour must consider if he would attempt to do good work. And in the work he may do it is to be hoped, for his own sake, and that of others, that he will never satisfy his own ideals though he may possibly perhaps sometimes please his critics. But let us begin by saying that his aim should never be to seek applause, but to do his best, whatever that may lead him to, with the faculties he possesses and the opportunities which arise.

In asking ourselves how we shall introduce colour in works of architecture, we have, broadly, to consider and decide whether it shall be done by using coloured materials as integral parts of the structure we wish to decorate, or by applying to the building such materials as will introduce the necessary colour. The two methods combined are in fact necessary for a complete satisfactory result.

Of coloured materials used structurally there are many old examples to be found, as is well known, in many parts of England. In Norfolk and Suffolk we may see how stone and flints have been used for this purpose, as in the parish church at Worstead, and the old Guildhall at King's Lynn. Essex gives us some instances where brick, stone and flint are associated in one building with very beautiful results. But in adopting the structural method we need be careful that we do not weaken the building by allowing our desire to introduce colour to interfere with sound principles of construction. There may often be some temptation to do this by allowing the design of decoration to interfere with the proper bonding of walls, whether in stone, brick or flint, or any other combinations of several materials. Much decoration has been done, and beautifully too, with building materials, but not all of it is structural. But where we may seek for freshness in the methods of design is surely to be found in an endeavour to use some of the very many durable stones which have fine qualities of colour.

In Praise of White Brick.

We have no doubt some time or other heard of a material called red brick. This has of course been used, but there seems no reason on grounds of expediency, or taste, why the white brick, so common in some counties, should not be adopted too. It is sound, strong and lasting, it possesses a good ring, and it has a modern virtue which none may despise, for it is cheap but not necessarily nasty if it is handled discreetly and with good taste. The yellow or dun-coloured stock brick is also a good colour. If it is used well, and, with some of those silver-grey bricks introduced into a wall of it, many excellent effects may be obtained. I say, "if" such and such a material is used properly, because this small word implies the necessity of care in selection, care in the association of materials, and, above all, care in the design, the grouping together of the several elements that help to make architecture out of mere building. We need not limit our ideas by clinging to the no doubt safe custom of painting external woodwork in greens or some tone of white or cream.

Why not White Tiles?

Tiles for roofing are too often red, but there is no reason why we should not resort to white ones sometimes, and we certainly should do well to decline to use so frequently the dead, textureless, purple-red ones, so much beloved by careful, but ignorant and untutored committees.

The subject of structural colour is one to which we all as architects might especially devote more attention than it has been given in the past. For it is in this province that we depend upon our own resources. In the case of applied colour we may call in others to assist us in realizing our ideals in the field of decoration. But in regard to decoration which is of the structure, we stand very much alone, and there is very little to hamper us in giving some rein to our fancy, except money. But it is, perhaps, really better that it should place some limit upon idealism, for without this we might be led to riot in extravagances, which would end in the destruction of all true principles of design. Byzantine and Italian art provide us with many examples of what was done during the centuries that are past, but we have some examples of a more recent date which should encourage us.

Effective Colour in London.

Mr. Street has given us in the north and east fronts of the Law Courts, one of the most thoughtful and effective instances in this class of decoration that is to be found in London. In this, red brick and a grey-white stone have been used. And though terra-cotta is nearly always a hard and most unsympathetic material, yet, in conjunction with brick of a very beautiful red, it has been used with great success in the Exhibition Road front of the South Kensington Museum. Mr. Norman Shaw has shown us in the new Police Offices with what advantage to building, as architecture, grey granite, red brick, and white-grey stone may be used.

Glazed Facing Bricks.

These instances indicate how some few of the ordinary materials may be made to serve us in our wish to introduce colour in building. There are of course, others, but given the opportunity, much might be done by resorting to the use of glazed facing bricks in London, where, in spite of their smooth surface, they would in time become toned down so as to be at least inoffensive.

We all know well that the Egyptians used colour on everything to which they could apply it, whether on the exteriors or interiors of their buildings. But they were favoured, like the other southern artists, by conditions of climate which allowed this freedom within certain limits.

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* Being a paper read before the A.A.

They used colour to clothe and express form, and to emphasize those features they thought called for such a treatment. And the methods they had introduced were those also which the Greeks developed at a later period. They coloured the designs in relief or those which were cut back from the surface as incised work, leaving much of the native grey or red of the actual building material to play its part as a ground for the whole of the more brilliant decorations provided by the details.

We may, then, use colour either structurally or by application to a material not possessing sufficient colour of its own to satisfy our need.

Structural Colour.

Structural colour seems the best method of providing what we require externally. For it is better able to resist a climatic opposition to its existence than applied methods, except those by which sound and durable colour materials are required as the medium of expression. We have, however, nothing to fear when we take up the question of internal decoration. For in this case we may adopt any method and any media we choose. And it is here we find the best opportunity for exercising our faculties for providing the necessary field for those who possess capacities which can satisfy our aspirations. The grounds or surfaces upon which we may begin our operations call for consideration under two heads. First, the material and texture of the ground and its own inherent qualities and capacities for producing, sustaining and showing colour; and then the colour and method of treating the ground upon which any work is to be done. I am not prepared to discuss these points in detail. But it will not be presuming too far, perhaps, to merely recall to your minds some materials which ordinarily are the ground upon which we may ask colourists to provide us with design. The staple material in Egypt apparently was granite, but they also used brick, as did also the Assyrians and Babylonians, with diversely coloured glazed surfaces.

Brick as Foundation for Colour.

Burnt clay, from the days of Sennacherib to the days in which we live, has always been found an excellent foundation for colour, whether plain, or dealt with as were those tiles and bricks which were covered each with its piece of design, or formed a portion of one treatment, covering some large expanse of wall or floor. The ordinary red brick of the building was used with little or no preparation as the ground upon which to work in the case of a large painting in Albi Cathedral, in the south of France, near Toulouse. This work, executed during the first ten years of the 15th century, was done directly upon the brick surface of the great circular tower piers within the nave. It has stood all these centuries without decay, and the lines of the brick jointing, which are clearly visible, are a decided help to the texture and general effect of the whole scheme.

Effective Colour in London—South Kensington Museum.

BRICKS BLUE, BLUED, AND BRINDLED.

To the Editor of "THE BRITISH CLAYWORKER."

DEAR SIR,—I am very glad to see from the article "Bricks Blue, Blued, and Brindled," which appeared in the Supplement to your September issue, that you are at last championing the cause of the despised brindle. That this class of brick is held in very low esteem amongst engineers and surveyors generally, in comparison with blue *or even "blued" bricks*, is beyond a doubt, and to a certain extent reasonably.

Certainly far too much attention is paid to the colour of bricks required for paving or other purposes for which the first qualities essential are hardness, toughness and impermeability, but in many yards the bricks supplied as "brindles" are simply those which, having been set for blues and failing to get their proper amount of heat and fire-flash, have not turned in colour sufficiently to pass as such. This kind of brick is found in most cases near the bottom of the kiln, especially against the screen walls, where, owing to the fire, as in most down-draught kilns, being drawn to the middle of the floor, the goods are not touched by its flash—perhaps the most important factor in bluing the bricks—and are consequently of irregular colour. Now, as every brickmaker knows, the softest bricks in a down-draught kiln are almost always near the bottom, and "brindles" supplied in accordance with this plan are bound to be somewhat inferior, in the point of hardness, to the blues which are taken from the top and middle of the kilns and have received the full benefit of the fire, and no doubt the use of the cheaper brick thus burnt is, in a great measure, responsible for having earned the "brindle" dog his "bad name."

On the other hand many brick manufacturers have in their works materials from which they can produce a brick equal to a blue in vitreousness and impermeability though their clays may not contain sufficient iron to impart a blue surface to it, and I think that, if surveyors and others had used such bricks more in the past instead of those which may be described as "refuse blues," the brindle brick would have been held in better repute to-day than it is.

It is a common fallacy to suppose that a brick cannot be as hard and impervious to water if it is not blue outside, and to think that a blue coating on it prevents it absorbing moisture whether the inside is vitreous or not, altogether losing sight of the fact that in comparison with the nature of the brick throughout, its surface is of very slight importance indeed. A blue coating on a vitrified or even semi-vitrified brick is, after all, very much like a waterproof covering put over a block of india-rubber to keep the inside of the latter dry.

Neither is the coating any criterion of the quality of a brick, for it is quite possible to produce it on a comparatively soft one, and hence the folly of the surveyor in accepting such and, *vice versa*, to make a vitrified brick scarcely distinguishable by its appearance from an ordinary common.

If surveyors would only take your advice and make more frequent use of the true brindle (I do not say the second-rate blue) I think they would get every satisfaction from the durability of the work, and save, at the same time, the pockets of ratepayers or others who employ them.

I am, yours faithfully,

Oct. 6th, 1899. "BRINDLE."

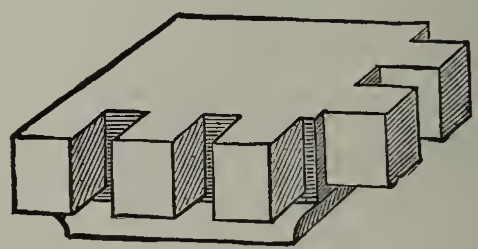
To the Editor of "THE BRITISH CLAYWORKER."

DEAR SIR,—I read the article on the above subject in the September number of the *British Clayworker* with considerable interest, and, no doubt, there is a great amount of truth in what you state as to surveyors insisting on having *blue* bricks, no matter what their quality may be, instead of a hard variety for many kinds of municipal work. There is nothing of the nature of magic in the colour *blue* that I know of; it may easily be produced by anybody who knows how to do it. Of course, where the tint is the result of the natural hard burning there can be no question, as a rule, of the fitness of such bricks for the purposes mentioned. At the same time, as you truly observe, there are bricks other than those of a blue tint, which are quite as non-porous and well suited for certain purposes—sewer work, aqueducts, conduits, and the like. Surveyors ought certainly to give them an equal chance.

I am, yours faithfully,

Oct. 12th, 1899. MIDLANDS.

ELLIS, PARTRIDGE & CO.,
200, PHŒNIX STREET,
ST. PANCRAS, LONDON, N.W.
And LEICESTER.
WORKS, RED BANK, MEASHAM,
AND WOODVILLE, BURTON-ON-TRENT.
ORNAMENTAL BRICKS TO ARCHITECTS' DESIGNS.
RED PRESSED AND SAND STOCKED FACINGS.



H. J. & C. MAJOR,
THE PATENT TILE WORKS,
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Sole Manufacturers of Patent Waterproof Roofing Tiles that have gained Highest and only Awards in every Competition, and are cheaper and more efficient than Slates.
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THE BRICKBUILDER.

NOTES BY F.R.I.B.A.

Bricks for Hospitals.

JUST now there is quite a mania on the part of local bodies to erect hospitals for infectious diseases of brick. No better material could be found for the purpose if there is careful selection of the kind of brick to be used in the first place. But that selection is often not carefully made. The other day we had occasion to visit one of these structures in process of erection. In order to preserve an ornate appearance the building was in red brick relieved with white. The former were fairly hard on the interior of the walls, but a large portion of the front of the building was being made with sand-faced rubbers. We have nothing detrimental to say respecting these latter when used in ordinary buildings, in fact we very much prefer to see them; but they are not suitable for hospital construction. The more nearly the brick is non-porous the better it is, other things being equal, for hospitals, especially for infectious cases. It is not sufficient to line the hospital walls with some non-porous plastering. Microbes will still adhere to the building if the exterior is made of porous materials. A hard, solid brick is unquestionably the best for hospital construction. Again, the brick should be plain, not ornamented in any way, and the smoother the surface the better. We all know how bacteria not only find lodgment in porous bricks but multiply exceedingly there under favourable conditions. We ought, therefore, not to afford facilities to them, at any rate, in erecting a building of the kind named.

American Coloured Bricks.

THE more extensive use of building materials of light-coloured bricks, in America, was begun about fifteen years ago. Light-coloured bricks were used before that time, but the use of the buff bricks of Milwaukee was limited, and most of the time prior to the period to which we have referred the bricks used in the East were almost exclusively red brick, and the pressed brick of Philadelphia, Trenton, and Baltimore attained great popularity. The tendency in the past few years has been towards the light-coloured bricks, which are made in many colours and shades of colours; thus we have yellow, buff, brown, grey, old gold, light red, salmon red, and cream. Mottling has also been largely introduced. Rough-faced brick, or "rock-faced" brick, as it is called, is also used to a considerable extent. The tendency in the last few years seems to be constantly towards lighter-coloured bricks, and now even white bricks are made in large quantities. Bricks may be made to order in almost any colour or shade it may be desired. The clays commonly found in most regions burn red, but by mixing together clays from various localities in suitable proportions, and by differences in the firing, various effects can be produced. Hard red-bricks cost from 24s. to 25s. per 1,000, while the light-coloured bricks cost from £5 to £8 per 1,000. The latter are not displacing the old red brick, however, as the number of common red bricks used is probably 1,000 times greater than the light brick, for fine bricks are used for a veneer only, as it were, for the face of the wall, for it would be a waste of money to build walls throughout of expensive brick when the ordinary red brick answers all purposes. Brickmaking is very largely a local industry, and brickyards are found all over the country, so that wherever possible the demand is supplied from the yards near at hand. American bricks are now exported to some extent to Canada, and for many years bricks have been shipped to the West Indies and some South American countries, and to-day American bricks for fire places are shipped to Germany and other European countries.

Roman and Pompeian Brick.

IN the former days when a brick was nothing but a red parallelopipedon of approximately uniform dimensions, there was no need of names to designate varieties of brick, but with the advent of the light-coloured burnt clays several appellations have been evolved, some of them with sufficient pertinence to stick and become a part of our architectural nomenclature. Two of these which are most common are the designations Roman and Pompeian. The origin of these terms is very manifest, and the names themselves appropriate to the shapes they designate. The ordinary common brick is approximately 2 by 4 by 8in., and this shape has obtained pretty generally in the past through France, the Netherlands, England, and in America, says our contemporary *Brickbuilder* on that side of the water. In Italy and in ancient Rome, however, bricks were very frequently made in different shapes. In much of the work in the Colosseum the bricks were triangular slabs of terra-cotta 1 to 2in. thick, and 8in. to a foot wide on each face, being laid side by side in courses with the points turned in to the wall, and backed up by and tied into a mass of concrete. Another very common form was 15 or 16in. square and not over 1½ or 2in. thick. These bricks laid up in the wall with very thick joints are found in much of the old work, and suggested the manufacture of a brick 12in. long, 4in. wide, and 1½in. thick, which form has found a great deal of favour in modern work under the name of Roman brick. As a matter of fact it is Roman only in appearance on the exterior of the wall, as the old bricks are nearly square, but in a decorative sense the term fits very fairly.

The term applies wholly to the shape of the brick, being entirely independent of colour or material. Texture, that indefinite quality which is so much sought after by our architects, is a marked feature of much of the old brickwork which has been exposed to stresses of weather. Some of the old brickwork in Pompeii seems to have been made with a mixture of rather coarse volcanic sand or cinders in with the clay, which on burning would show black spots at irregular intervals over the surface. This is the prototype of what we to-day style Pompeian brick, which presents an appearance of having scattered through it a lot of rather fine, thoroughly burned cinders, giving a speckled appearance to the exterior, which for some purposes is very pleasing. These bricks suggest a wall which has passed through a conflagration, the brick having an over-burnt appearance, such as might be expected of bricks dug out of a city buried for centuries under the deposits of a volcano. As a matter of fact it would be hard to find many bricks in Pompeii itself which bear any close resemblance to the speckled bricks which now are designated by the name of that city. Still the appellation is a fair one, and one which seems to fit the case, and has found sufficient favour to be considered as a permanence. The term applies wholly to the mottled, cinder-specked appearance, being entirely independent of shape or size.

THE MANUFACTURE OF MAJOLICA.

No. VIII.—MATERIALS.

In regard to the composition of bodies for dust tiles, it is necessary to bear in mind that the consolidation of the finished tile is due to two separate causes :—

(1.) The adhesion under pressure of the plastic particles at their points of contact. This is however not sufficient in itself to produce a thoroughly hard durable tile unless the clay particles are extremely fine and the firing carried higher than is possible with freedom from warping.

(2.) A further cause for hardening of the tile arises from the vitrifying of the material during the firing. We must therefore consider the necessary ratio of plastic clay to that of the vitrifying material, such as Cornish stone, or Felspar rock. Beside these ingredients, it is necessary to add a certain proportion of flint with the object of improving the colour of the body, and also reducing the shrinkage and warping. With some classes of glazes it becomes necessary to considerably increase the amount of flint in the body to prevent crazing. At the same time the heat at which the tiles are fired is proportionately increased.

The adjustment of the proportions of the various materials in tilemaking from dust needs most careful attention for another reason. The die box in which the tiles are pressed must obviously be adjusted to a definite size, allowing for the shrinkage of the material. Any change in the proportions of the various ingredients will tend to change the shrinkage, making it greater by the addition of ball clay, or stone, less by the addition of flint. Unless the required properties of the tile body are carefully decided upon before the size of the dies has been adjusted to the shrinkage, it is often difficult without great sacrifice of plant and dies to make any radical change in the body composition. The amount of moisture added to the ground dust has some considerable effect on the amount of shrinkage, but it will be found that any great change in the proportion of water added, will not give an equally satisfactory result. There is with every body a certain definite proportion which cannot be departed from, and this bears a direct ratio to the proportion of plastic material the body contains.

It must be borne in mind that the cohesion of the mass is entirely due to moisture mixed with the clay, and that no amount of pressure will consolidate perfectly dry clay into a tile. The important points requiring attention are :—

(1.) That the body must contain sufficient plastic clay to enable the tile to be easily consolidated.

(2.) The body must contain sufficient non-plastic material to allow of the moisture being brought readily into contact with the clay particles in such a way that these do not become unduly massed together in sifting, or collected together when falling into the box.

(3.) To allow the introduction of sufficient vitreous material such as Cornish stone, which will give hardness and good ring to the tile after firing, yet without unduly promoting warpage of the tile itself.

The materials requisite for the manufacture of Majolica cover a very considerable range ; if by the term it is intended to include the stanniferous as well as plumbiferous varieties. The composition for the former include calcareous marls containing a percentage of lime usually considered excessive in the plumbiferous wares of this country. Moreover, the plasticity of bodies required for use in throwing vessels on the potter's wheel, is much greater than that required for machine-pressed or moulded wares.

Of late years it has been customary also to include with Majolica the hard-fired bodies used for architectural faïence exteriors, which are largely composed of some refractory fire-clays. It will be seen that almost every kind of natural clay is thus available for some form of Majolica.

One reason of the extensive adoption of Majolica is the low heat at which the biscuit is usually fired, thus enabling a very large variation in the composition of the clay adopted. The body being vitrified, many natural clays which, at a higher biscuit-fire would have become useless, owing to the excess of fusible ingredients combined with them, could under these conditions be used with perfect safety. For this reason, the local clays of various districts became available without having recourse to prepared bodies.

Indeed, it may here be pointed out that it is only when the higher biscuit temperatures are attempted that the need of careful control of the body composition becomes necessary.

Natural clays do not remain constant in the proportion of the various ingredients nor the physical condition of the particles.

The potter is liable to constant variation in shrinkage, fusibility, and colour. All these inequalities are greatly exaggerated in importance directly the heat is increased, and it therefore becomes necessary, under these more risky conditions, to ensure a perfect control over the composition by using an artificially prepared body.

Notwithstanding the diversity of materials used for the production in various places, it is remarkable how slight the actual difference is in composition between the wares included in this group.

With the exception of Palissy ware, which contains less lime, the analysis, as made by Broigniart, shows a remarkable similarity, as will be seen below.

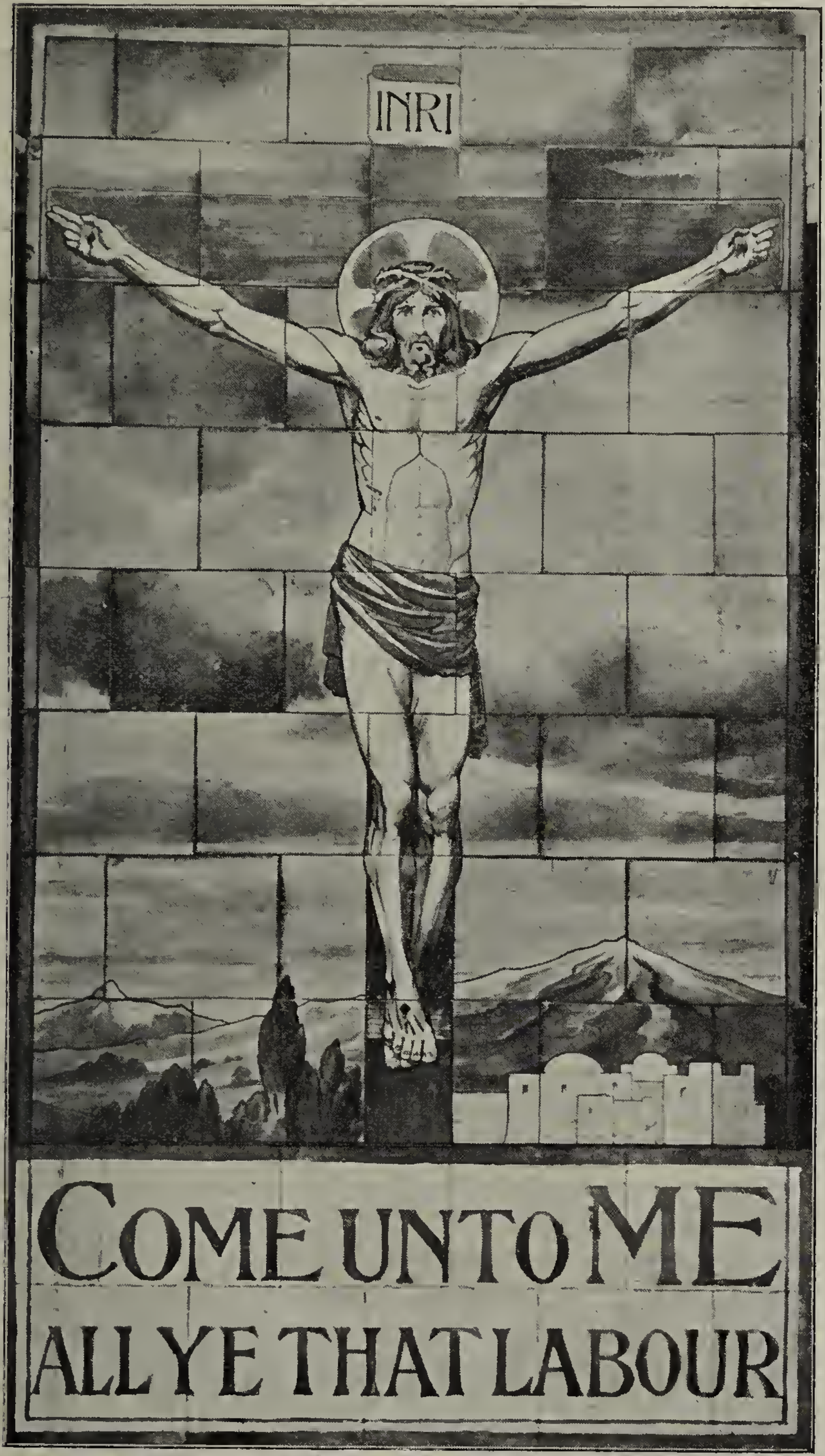
	Lacea Della Robbia.	Majolica.	Delft.	Palissy.
Silica	49·65	48·00	49·07	67·50
Alumina	15·50	17·50	16·19	28·51
Lime	12·40	20·12	18·01	1·52
Magnesia	0·17	1·17	0·82	—
Oxide of Iron	3·70	3·75	2·82	2·05
Carbonic Acid and Loss	8·58	9·46	13·09	8·42

It has been suggested that so close a resemblance gives evidence of a common source of information, though there is no certainty of this.

Serious Fire at Napton-on-the-Hill.—We regret to record a serious fire which broke out at the brickworks of Mr. Charles Watson, near Rugby. This occurred between nine and ten o'clock on the evening of 25th October, and although the night watchman was on the premises he was not aware of the fire until his attention was called to it by a neighbour. The fire was then found to be too far advanced for two or three men to stop it, and assistance was sent for to Southam (three miles) for the fire brigade. Being a windy night and the roofs composed of wood and felt, the fire made headway before any assistance to check it could be obtained. The Southam Fire Brigade did not arrive and get to work before half-past eleven, and it was not until three or four o'clock that the flames were checked. It has damaged the buildings and completely destroyed the roofs and floors, one shed 150ft. by 44ft. ; one 44ft. by 40ft. ; one 40ft. by 30ft. ; one 30ft. by 25ft., and about half another shed, 150ft. by 40ft., and much valuable and nearly new machinery. By great exertion the brigade and helpers managed to save the new tile-roof shed and the fixed engine and boiler house and oil stores with brick machine. No cause can be assigned for the fire, and, unfortunately, it is only partly covered by insurance.

PANELS FOR EXTERIOR DECORATION.

We are now enabled to illustrate one of the panels to which we referred in a brief note of last week, the work of Messrs. Doulton & Co., Limited, for the exterior of a Glasgow mission church. There is to be a series of panels which are to form "Sermons in Stones," the minister recognising the power of street advertisement and preferring to spend his money upon exterior instead of interior decoration. Messrs. Doulton are producing five striking cartoons, of the first of which we give an illustration. It has been found that the usual class of tile paintings, when exposed to a city atmosphere, are not always satisfactory from their want of permanence, and as regards ceramic materials that none but those that had received the severest firings would have much chance of permanence. Messrs. Doulton & Co. have sought to carry out on a stoneware basis the method of decoration known as majolica painting. As carried out by Della Robbia and other mediæval potters, the process consisted in covering a slab of terra-cotta, with a thin coat of an opaque white enamel. Upon this coating the paintings were executed, and, on being subjected to a second firing, the painting and the enamel surface were fused into one. Majolica, however, does not admit of being fired to such a degree of hardness as is desirable for exterior decoration in these climates, and Messrs. Doulton's experiments have led to the preparation of a hard stoneware body and an enamel covering which can be fired at the same stoneware heat as the body itself and in the same kilns. Paintings fused at such an intense heat as this are not likely to be attacked by the deleterious acids found in town atmospheres, and the decorative scheme once decided upon will remain permanently enshrined.



THE LATE SIR ARTHUR BLOMFIELD, A.R.A.

It is with profound regret that we have to chronicle the death of Sir Arthur Blomfield, which took place quite unexpectedly on Monday, October the 30th.

Sir Arthur was at the time at his club playing billiards, and his death was due to heart disease. The deceased, a distinguished architect, was a warm supporter of the Building Trades Exhibition inaugurated by Mr. Montgomery, and was one of the best friends it had. At the Exhibition held in April last, Sir Arthur Blomfield seconded a vote of thanks to the chairman at the opening function, and two years previously he undertook a like part in the proceedings. A man of singularly generous temperament, he had a reserved and almost shy manner, and always strove to avoid publicity; what he did for the Exhibition was done out of sheer good nature.

Sir Arthur Blomfield was the son of the late Bishop of London, and was born at Fulham Palace, on March 6th, 1829. He was educated at Rugby and at Trinity College, Cambridge, where he took his M.A. degree. He received his professional education as pupil of the late Mr. Hardwick, architect to the Bank of England, whom he eventually succeeded in that post. In 1888 he was elected an Associate of the Royal Academy; in 1889 he received the honour of knighthood; and in 1891 he was awarded the gold medal of the Royal Institute of British Architects. Among other appointments he held may be mentioned that of architect to Lincoln Cathedral, where, in 1898, he succeeded Mr. Pearson, R.A. In 1899 he was appointed architect to the committee for the restoration of Chichester Cathedral, and he was diocesan architect for Winchester. He recently built a chapel for Wellington College, was architect for Winchester and Eton Colleges, and was employed by the Prince of Wales at Sandringham.

He was mainly interested in Ecclesiastical Architecture, two of his last examples being Sion College on the Embankment, and the Church House at Westminster. The nave of St. Saviour's, Southwark, was also restored by him.

A man of genial manners, refined taste, and solid worth, his loss is greatly deplored in artistic and social circles.

BRICKS BLUE, BLUED, AND BRINDLED.

To the Editor of "THE BRITISH CLAYWORKER."

DEAR SIR,—So much has been said in your September and October issues on the qualities of blue bricks, that we reluctantly ask your indulgence.

We agree that many kinds of brindled bricks may be used with advantage in walling, bridges and such work, but they will never supersede blue bricks for sewers and similar work where a hard brick with a good face is required, and brindled bricks (unless they be the grey brindled fired from blue clay) cannot compare with blue bricks for paving purposes.

"Brindle's" description of the production of brindled bricks in a blue oven is correct, and this shows their inferiority to the blue which have had the necessary fire.

We do not believe there is any clay, used for the bricks referred to in your article, which will stand the same heat as that which will produce best blue bricks, and it is impossible to fire a brick a natural blue ½in. deep without having the centre nearly as hard as if blue through, and harder than if black through, as the latter can be done at much less heat by keeping out the air when finishing, and the artificially produced black bricks which are often sold for blue are produced at a lower heat.

We think your correspondent will find few to agree with him that a brindled brick will answer as well for paving purposes as a blue, and we know from experience that there are no bricks so suitable for this as a properly burnt, well made brick from Staffordshire clay, and the fact that they are used throughout the British Isles and largely exported bears this out. It may then be taken for granted that the best information on the subject can be obtained in Staffordshire, and we will undertake to say that if you, Sir, will address an enquiry to other makers of blue bricks in North and South Staffordshire as to whether a best blue paving brick should be burnt right through to the centre, the unanimous opinion will be "no," and they will also tell you that although they can burn them to this degree, if they did so, the nature of the brick would be, to a great extent, burnt out and they would not be so strong and tough as a brick which had been burnt to not less than ½in. in depth from surface and dark brindled in centre. If occult demonstration were needed we would ask the writer of the article if he saw the samples of Blue Bricks which were exhibited at the last Building Trades Exhibition in the "Surveyors'" Section; these bricks have been laid down in streets of towns under heavy traffic for 25 years and show scarcely any wear, yet these when broken show brindled inside.

Yours faithfully,

G. WOOLLISCROFT & SON, LTD.

Encaustic Tile Works, Hanley,
10*th November*, 1899.

[The article was never intended as an attack on BLUE BRICKS. It pointed out, and rightly so we think, that a brindle, however poor, is better than the rubbish which often passes for a BLUE brick because it happens to boast that colour, and has no other qualification.—ED.]

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SUPPLEMENT TO THE BRITISH CLAYWORKER.—DECEMBER, 1899.

THE BRICKBUILDER.

NOTES BY F.R.I.B.A.

Strength of a Brick Vault.

In connection with the removal of the old Public Library building, Boston, says a contemporary, to make way for building a new structure, it became necessary to tear out the vaulting which supported a portion of the side-walk. There were four plain barrel vaults supported on walls at right angles to the line of the side-walk, each vault covering about ten square feet, with a rise of about two and a-half feet, laid up in three rings loosely grouted over the haunches, a very ordinary form of construction, but one which was interesting by reason of its extreme cohesiveness. After the whole of the interior wall parallel to street line and three of the intermediate brick walls from which the arches sprung were entirely knocked away, the four vaults still remained in place, and were not materially weakened by a stone weighing over a ton being dropped on it repeatedly from a height of twenty feet. It was only after the crown of three of the arches was cut clear through that the work fell, and even then a considerable segment of one of the last arches remained in place, and it had to be torn down almost brick by brick. The material was ordinary good hard-burned brick laid up in cement mortar. This work was laid in 1855.

Concrete *versus* Brick Cottages.

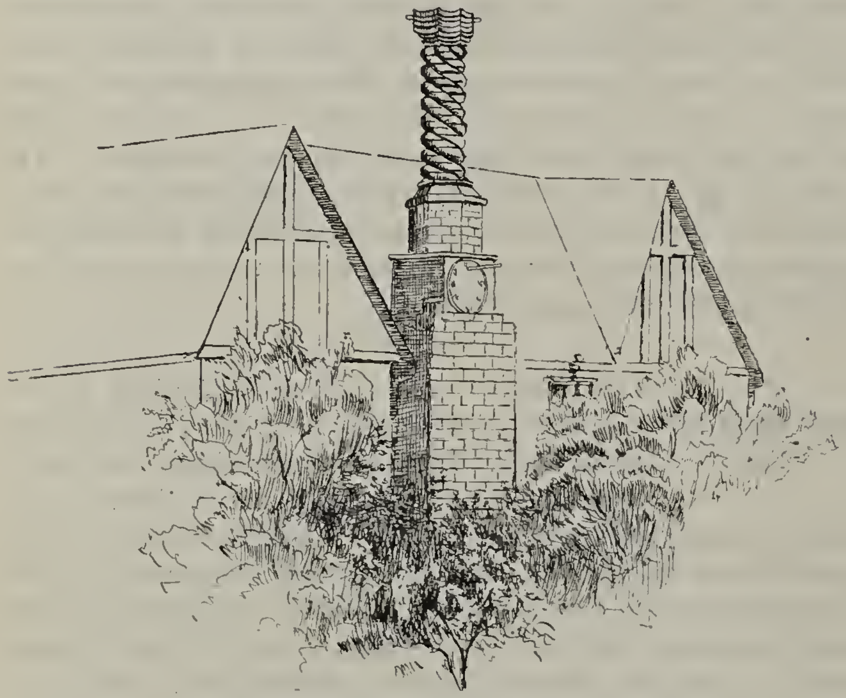
An animated correspondence is proceeding in our learned contemporary the *Spectator* to shew that if cottages in country districts were built of concrete, agricultural labourers would remain on the land instead of migrating to towns. The argument is ingenious, but very far fetched. It may be summed up as follows :—Concrete is a cheaper material than either brick or stone ; the cottages therefore would not cost so much to build ; the labourers must have good house accommodation ; at the present rate of low rents for land the landlord cannot afford to build expensive cottages ; so concrete is the material for the purpose. We have heard that tale before, but we very much doubt whether the question can be solved in such a simple manner, and we have grave doubts whether it is advisable on economic grounds to build even labourers' cottages in the "cheap and nobby" style. We may remind the letter writers that a beneficent government, through the Board of Agriculture, has a great deal to say on the subject of the erection of labourers' cottages. So many of the larger estates in the United Kingdom are entailed that the tenant for life, however rich he may be, most often avails himself of the borrowing powers at a low rate of interest which the Government half-a-century and more ago provided for by legislation. When the large landowner wants to put up labourers' cottages he commonly borrows as this Act has enabled him to do, the repayment being spread over a term of years—usually 25 years. This is not generally known, because the loan is a first charge on the estate, the money is obtained only from sources specified by the Acts, and the whole thing is done semi-privately. At the same time, the Board of Agriculture determines the materials and cost of the cottages to be put up, and the Board practically controls the whole business. This is done in the interest of the heirs to the estate, who for the most part eventually have a large share in the repayment. And, the Board of Agriculture (formerly the Inclosure Commissioners, and the Land Commissioners) has controlled the erection of thousands of such labourers' cottages throughout the country. The letter writers would be more to the point, therefore, if they approached the Board in reference to the matter instead of the Press. The present writer had nine years' experience of the ways of the Government department mentioned, and he can safely assert that any attempt to construct agricultural labourers' cottages of shoddy material would not receive the sanction of the Board. Brick is the material most commonly specified by the Board, and quite right too. Of course, in districts where bricks are dear, stone is employed, but in the majority of cases where agricultural labourers dwell there is a rich soil, and bricks (not stone) form the staple building material. We unhesitatingly assert, therefore, that where the house is to be a permanent structure, and of cheap construction in addition, there is no better all-round material than brick—and the Government is of the same opinion.

Bad Roofing Tiles.

The common and garden (suburban) house is roofed with slates—or what is generally called slates. The up-to-date residence has tiles. Now, this is curious. The reason given for the discontinuance of tiles (for they were in general use not so long ago) is that the roof timbers of the jerry builder had to be enormously fortified to bear them. There is no accounting for taste, however, and with the revivification of the "Queen Anne's" style, we see tiles again in common use. But, such tiles ! They are not the common and garden tiles. They are the quintessence of the patent office in their line, and are provided with internal lappings, ridges, V-shaped pieces, grooves, projecting bands and what not. They are rain-proof, dust-proof, air-proof, fire-proof, and other sorts of "proofs," but very few of them can withstand a moderate wind, and few would pass an examination in the divers "proofs" mentioned. This is from the architect's point of view. Many firms turn out an irreproachable article, we are not alluding to them. But when a tile is warped, cannot possibly fit into the patent groove provided in the under-tile, the V-shaped arrangement leaks at the base, and the theoretically well-fitting tile is not to be coaxed, so as to keep either the rain out or the nail in, it is time to consider things. We admonish nobody, and we are in this column only considering tiles from the architect's standpoint ; but, there is room for improvement. It may best be sought, perhaps, in educating tilers in their work. It is one thing to attempt to make close-fitting tiles, and another to find strike workmen to fit them up. Is not that the real solution ?

BRICK CHIMNEYS.

We suppose it is too late in the day for architects or builders to employ specially made bricks in the construction of ordinary house chimneys. And yet, whilst the present craze for building chimneys with a lot of superfluous "top hamper" continues, it is not to be wondered at if, when half a gale blows, considerable havoc is wrought, and many of the chimneys come to grief. Anyone who cares to do so will notice that the average modern chimney (especially in those districts where "eligible villas" are being shot up) is fairly tall for the size of the rest of the building. It begins by sprouting out through the roof as a comparatively slender shaft, if of white brick the shaft will have a projecting course of red brick (one brick thick) about two-thirds the way to the top. Towards the summit the red brick is again called into play the lowest course projecting a couple of inches or so, the next above further project to about the same extent, then comes the principal *force* of the ornament in the shape of two or three more projecting courses, the summit being reached after a constriction to the extent of a few courses. Nothing could be more absurd than this mode of chimney construction, but if it is still to continue, light bricks should unquestionably be exclusively employed in the upper and projecting portions.



CHIMNEY ON AN OLD ESSEX COTTAGE.

The gales of the early part of the present year sufficiently demonstrated the fact that when damage was done to a building the first part to go was the chimney, which usually fell on the roof and succeeded in demolishing a great part of the latter. Bad mortar was, no doubt, responsible for some of this damage, but it is equally certain that in many cases the mortar was of good quality. The gale causes the chimney to oscillate and being top heavy down it comes. We do not suggest that light bricks of the kieselguhr type should be employed, but surely there is room for a light sand brick, and the smaller it is made, within reasonable limits, the better. Indeed many of the lighter makes now in the market are eminently suitable for the purpose, and it is highly desirable that the attention of architects should be specially drawn to them, and their advantages pointed out.

In the days when competition was not so keen as it is now, when dwellings had not to be rushed up, and every device and mechanical aid possible to be brought into play to get the job out of hand, there was time to give to the erection of solid and lasting work. Chimneys were *made* in those days and looked upon as part of the house; now they are too often mere appurtenances which may be purchased wholesale, like drain pipes, from the nearest builders' merchant. Their appearance, too, is not unlike the drain pipe of commerce, except when the house is particularly "eligible," as above mentioned.

It is too much to expect that we can go back to the old days of labour, when time and money were as nothing compared to quality, but we can at least make room for the substantial article in place of the shoddy variety.

In the page illustration we give of a portion of Hampton Court, it will be seen that the chimneys stand out as quite an essential feature of the building. Touching upon the question of chimneys, it is interesting to read what Mr. Ernest Law in his interesting book on Hampton Court has to say:—

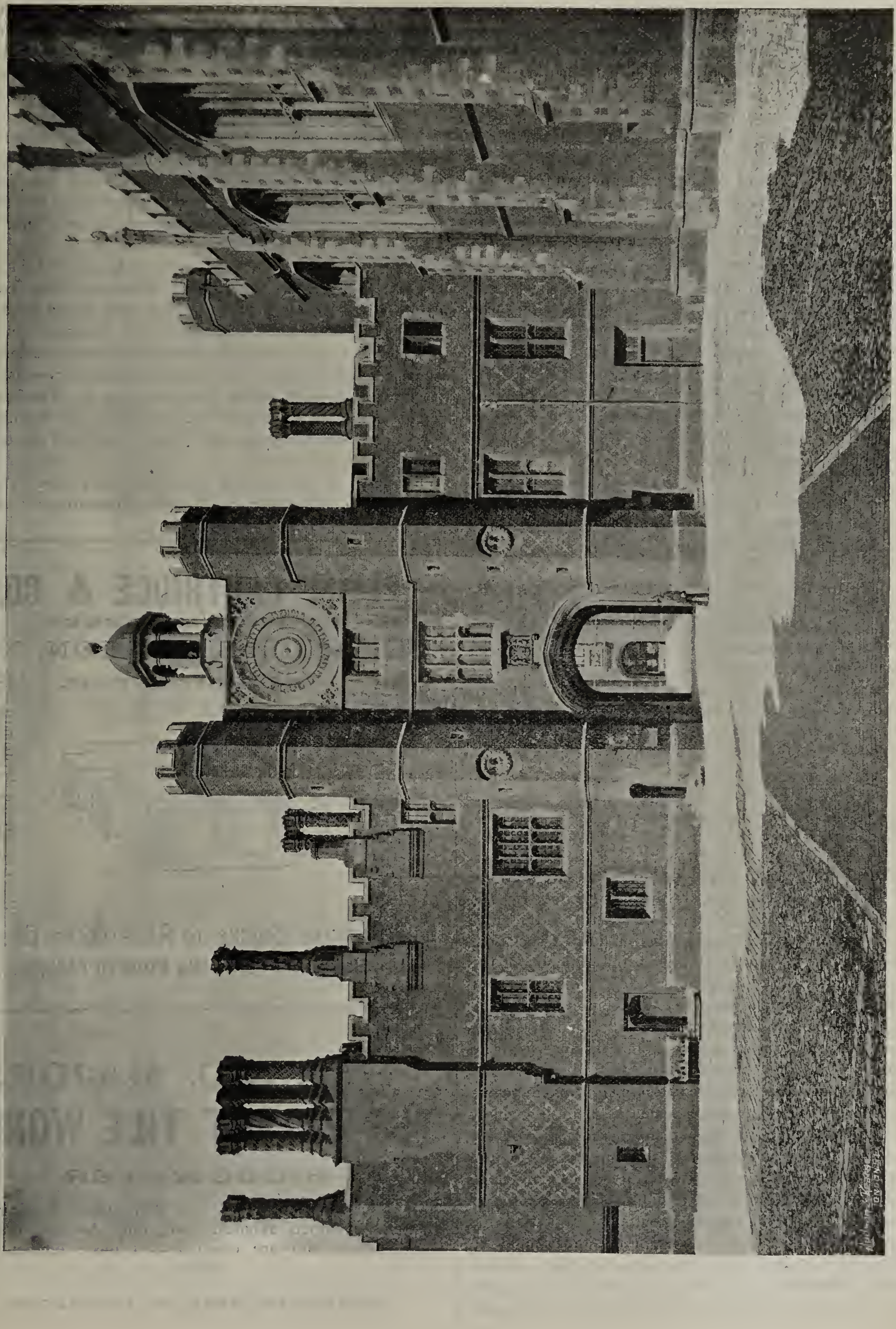
"An especially striking feature in Wolsey's west front, as in other parts of the Tudor buildings, is the delicately moulded forms of the chimney shafts, which rise in variously grouped clusters like slender turrets above the battlements and gables. They are all of red brick, constructed on many varieties of plan, and wrought and rubbed with the greatest nicety into different decorative patterns. Some are circular, some square (but set diagonally), and some octagonal; and they are grouped in two's or four's, with their shafts sometimes carried up solid, and sometimes separate."

[Nearly all the existing chimneys are modern restorations, but they are exact copies of the originals.]

"Another charm is the deep crimson of the bricks, approximating often to a rich purple, which contrasts favourably with the staring scarlet of modern red brick-work. This is particularly the case in the south or right-hand wing, one of the most picturesque portions of the whole palace.

"The pleasing effect of the old brick-work at Hampton Court is, in a great measure, due to the different colours of the bricks, varying from a light red to a purple brown. On the contrary, the mechanically-made bricks of the present day are all scrupulously given exactly the same tint."

Mr. Jno. Belcher, says that the well-known terra-cotta roundels on the gateway turrets were made by an Italian, Giovani de Majano (£2 6s. 8d. each). They were similar to the terra-cotta busts used by Holbein in the gateway at Whitehall, and, like them, were fixed in the turrets, This use of terra-cotta is fair and legitimate. It is obviously not a constructive material, and the early instincts of the honest builder kept it in its proper place. Another example is in the plaque containing Wolsey's arms—also in terra-cotta. These and the roundels have well developed Renaissance details, which were evidently not regarded as in any way incongruous by Wolsey or Henry VIII. The bricks, we are told, came from Brouxham, Taplow, and other adjacent localities. With regard to the external effects, the beautiful texture was obtained by the inequality of the bricks, and the use of vitrified bricks in squares and lozenges. It is this which imparts to the whole that purple tone which is so much admired. He does not believe that this was done from a dislike to plain surface—that is a modern complaint—because there is no great regularity in the position of the hatching, but it is touched in, much as an architectural draughtsman might resort to a little cross-hatching to suggest colour to the surface. This treatment of the surface has been carried a little further in the first court, where there is a frieze



Brick Chimneys at Hampton Court Palace.

or band of lozenges regularly placed and repeated. The use of chimneys, especially of shafts or terminals, was recent, and attention was drawn to this aristocratic novelty by the elaborate and varied treatment of the shafts. It is this frank treatment, of a new feature or requirement which we do well to note. Instead of hiding it, or endeavouring to represent something else of an earlier date, advantage is taken of it in the design. Its purpose is recognised, while it is used as a decorative feature.

Most, if not all, of these cut-brick chimney terminals have had to be rebuilt, and pipes have been introduced to make them more operative. It should be remembered that they were more or less an experiment. As a picturesque feature they are so successful that they have been imitated, though not rivalled, during the Gothic revival, whereas the men of the "Later Renaissance," such as Wren, still following true principles, discarded the separated shafts for the practical reason that by grouping or combining several flues in a square mass they gained in effectiveness. It is obvious that if the flue exposed to the external air is of thin brickwork (and that cut) it will be cold and the smoke will not pass easily; whereas, if the flues are grouped together, and have good outside enclosing walls, like the large chimney stacks of the later work by Wren, they will be serviceable.

Whilst on the subject of brickbuilding, some particulars as to the cost of brickmaking in Tudor times will be interesting. We find in the Chapter House Accounts (1535), the following outlays :—

> *Bricks.*—Payd to John Larkyn of Salrydgeworth, brykmaker, for dyggyng, mouldyng, settyng and byrnyng of five hundrydth thousande, four score, thre thousande brykkes by hym byrnt and delyveryd at the bryk-kills wythin the Kynge's Parke, at Hampton Court, takyng for every 1,000 brykkes there so brent and delyveryd at 2s. 10d.—£82 11s. 10d.
>
> *Chimneys.*—Also payd to Robt. Burdges of Hampton, bryklayer, for 12 chemney shaftes with theyr basys, geraundes and heddes reddy sett up and fenysshed uppon the quenys new lodgyng at 45s. the pece—£27.

TERRA-COTTA AND ITS USES.

A LECTURE on terra-cotta and its uses was given at the Midland Institute, Birmingham, on the 24th ultimo, by Mr. J. C. Nicol (Messrs. Essex, Nicol, & Goodman). Mr. James Patchett (President of the Birmingham Builders' Association) presided. The lecturer, after pointing out the antiquity of the use of terra-cotta, as illustrated in the buildings of the Babylonians and Assyrians, described the composition of the material. Most modern manufacturers, he said, had to mix and blend their clays, bringing parts from a distance, so as to get together a suitable combination of texture and colour, whilst some introduced colour pigments, which in baking came out quite different from what was expected of them, though by repeated trials and observations good tints, particularly bluish-grays and pinks, could be obtained.

Architecturally speaking, the term terra-cotta was given to the blocks above the size of ordinary bricks, and capable of decoration by casting from a modelled enrichment. The forms used should never be made on stone outlines, nor should the material be made to look like stone in any particular. It had a distinctive character of its own as a plastic and modelled material, although there was no structure in stone that could not be worked out in terra-cotta. Indeed, by the use of iron brackets and concrete cased with terra-cotta greater projections could be obtained, and columns and entablatures of any size could be wrought out. Yet the architect who had been accustomed to design heavy stone buildings, and wished to change his material, would fail dreadfully if he did not realise that he was working in an entirely different medium.

Terra-cotta itself would not outrage any of the canons of art, but the misuse of it would. When subjected to heavy weights in walls, due to imperfect filling, terra-cotta was liable to crack. The pocketing taken out to equalise the shrinkage in burning must be filled in with a concrete that would not shrink when set.

Referring to the durability of the material, he said it was sometimes desirable in exposed situations that copings, cornices, and gutters formed in terra-cotta should have damp courses of lead or slate in case the joints should perish, and in all cases the ends and joints should be made in cement. All blocks should be equally well burnt, as the ordinary constituents of town atmosphere would then not affect it. The free acids found in the air of manufacturing centres like Birmingham would permeate the pores of the soft bricks and dissolve the more soluble constituents.

A number of specimens of terra-cotta work were on view in the room, and a moulder gave practical illustrations of his art.

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THE BRICKBUILDER.

NOTES BY F.R.I.B.A.

Architectural Majolica. It is the fashion now-a-days, and rightly so, to decorate the interiors of many excellent buildings with majolica. But, the architect does not yet understand the material, or he would use more of it. It seems to be sufficient, in specifications, to state that such and such a part of the interior is to be decorated with majolica, and there the matter rests. The shape of the ornament may be suggested, but even that is too frequently an afterthought. The colouring is left almost entirely to chance, a general scheme, on the broadest basis, having to suffice for even what are called good works. That is an insult to the material. It is treating it too much like a flower-pot, to be hidden by whatever may be put around it. There is a place in architectural treatment for majolica, and it ought to fill that place. Shining and glittering surfaces are under most circumstances, to be avoided, but when it comes to minor detailed ornament, not of an obtrusive nature, and where warmth is desirable, it is difficult not to employ glazed material. True enough, it will not bear much looking into, but that is a feature not uncommon in such artistic productions as those of the immortal Turner. It is the grand effect of the whole that is aimed at, not the gaze of the critic who uses a microscope Our critics may prefer marble for grand breadth of surface. treatment; but there is this much to be said for our majolica, that it does not stain in the course of years, it preserves its polish, and will take a lot of beating for warmth of colour in general architectural effect for interiors.

Domestic "Fire-bricks." Although there is a general tendency for every article used in the household to become worse and worse in quality as time rolls on, there is no occasion for the maker of fire-bricks as used in the kitchener to be so much depreciated in quality as to suggest that they have none of the attributes of the fire-brick of old. Some districts may be exceptionally well furnished with kitchener backs and sides, but the modern architect finds it very difficult to select the bad material from the good. Other districts furnish no sort of cheeks or backs which bear more than an inspection. The usual repertory of these latter is the "oil-shop," which provides anything from a needle up to a house. It is useless to ask the owner of the shop where he obtained these cheeks and backs from. He only knows that he obtained them from such and such an agent. And, we do not suppose, that from the agent's point of view, more knowledge need be imparted. But, it is extremely annoying to an architect to find that after having taken all due precaution as to the building of a house, when the style is everything the client can wish, when the latest fad has been duly appraised and fixed up, when the builder's "extras" even have passed muster and the architect's fees paid, that the client writes complaining of the quality of the "cheeks and backs" all over the house. In the midst of a large practice the architect may have to delegate much of the actual supervision of the building and finishing to an assistant. It is not, however, that the architect has any desire to lay shortcomings at the door of his assistant ; it is rather that he expects a little more attention from the contractor, and the firm from which the contractor gets his "fire-clay" goods. The question of the backs and sides of grates does not affect the architect until the grates have been used, and then—well let them tell their own tale. In the course of a few months the kitchener bricks become caked with clinkers. These latter are knocked off in cleaning the grate ; a piece of the brick is knocked off at the same time ; and the whole has to be renewed. It may be argued that kitchen fire-bricks have much to contend with. Such an argument, however, is childish to those who know what a fire-brick really is, and what a really good one is capable of withstanding. The architect's client, further, is more annoyed about the backs of the grates of the ordinary rooms of the house. These crack and wear out in a very few months, and in addition to the annoyance caused, there is very strong probability of the house catching on fire. The actual harm done in each case is not so much material as moral, for the fear of a conflagration is always more abiding than the actual accomplishment, which rarely comes. The remedy for the evil is not very apparent, for honest clayworkers will always have to contend with the others, and the latter are adepts at infringements. The only immediate partial remedy that suggests itself is that each cheek and back should bear not only some symbol of magic or mythological significance, but something of a more concrete nature in the form of name and address, so that the culprit in each case could be traced and brought to account.

Terra Alba. We have recently been asked what terra alba is. It is one of those substances the history of the production of which is clear enough, but its history after that is particularly uncertain. It seems to be known only in England to a chosen few who take particular care to keep what they know about it to themselves. And they have every reason to do so, in most instances. Terra alba is ground gypsum. It is in at least two qualities depending upon the purpose for which it is required. The chosen few have learned a few wrinkles about it from Nova Scotia. It is to some extent employed in making up cheap white pigments, where the purchaser in some instances imagines he has white lead. Now and then it may usurp the place which ought to be occupied by barite in paint manufacture. It is of a very clinging nature and wherever the manufacturer has a mind to cause a substance to be rather more weighty than it ought to be he often fondly looks towards terra alba. In short, it is commonly used as an adulterant for many purposes—far too numerous to specify. The substance is not injurious to health, unless the taker deliberately sets himself to feast on it. It cannot be classified as a plaster, for it is not calcined, and the prime qualification to be possessed by the gypsum from which it is made, is that the latter shall be as pure as can be. Of course, so far as its use in cheap paints is concerned, that is legitimate enough ; but of some of its other uses—well, we would rather not express an opinion. Somerset House might, however, do so, if it felt that way inclined.

THE MANUFACTURE OF MAJOLICA.

No. IX.—TILE PRESSES.

THE use of Presses for the consolidation of clay into requisite forms, has given considerable impetus to the industry and has become such a necessity for the manufacture of Majolica tiles, as now produced, that a notice of the various types of machines and the principles upon which they are constructed and worked, may be reasonably included within the present chapters. The use of this method of formation has many advantages, and considerable economy may therefore be effected by their use. The employer is not so dependent upon the skill of the worker as in the production by hand-pressing, nor is there the same uncertainty in the matter of uniformity. A reasonable amount of attention ensures an output of any given number free from serious variation. Moreover, the introduction of machines having considerable strength, enables the worker to greatly increase the consolidation of the material, and the result is that a much stronger article is produced Greater speed of production can also be obtained, the rate at which tiles can be formed by this method being vastly greater, and the economy consequently increased in proportion. Nor are these the only advantages to be secured. The moulds and dies being made of metal there is considerably less wear than in the case of plaster. Greater sharpness of detail can therefore be secured, and although it is possible to over-rate this benefit from an artistic point of view, many of the leading manufacturers have sufficiently appreciated the need of care in avoiding this abuse, by skilfully adapting the methods to the material. It is also obvious that although the original cost of the moulds may be greater than that of plaster, the length of time they can be used without renewal in the end shows a considerable reduction in comparison at first sight. It might appear that these advantages are so numerous that all other methods would be abandoned. New difficulties, however, arise in the adoption of this mode of manufacture, and new risks are incurred which require to be appreciated. The first of these is that the size is limited to a smaller area owing to the heavy pressure required when large pieces are produced from stiff clay. As a rule from 8in. to 12in. square has been the limit adhered to for production in dust. It is true that in a few cases large hydraulic or steam presses producing pieces 24in. by 24in. in stiff plastic clay have been manufactured, but the larger the piece the greater the difficulty in securing a uniform pressure and obviating warpage, so that the risks in such cases have often been found to counterbalance the economy in production by means of such presses. It is absolutely necessary that the clay should be quite stiff, as soft clay for many reasons proves unworkable, but stiff clay takes more power in preparation and also in pressing, and the power required is greatly augmented, as the area of the surface is increased.

THE REASON OF THE DIFFICULTY in working soft clay is that it exudes through the crevices between the plunger and the box before it has an opportunity of being consolidated. If the plunger fits the die, air is imprisoned; this acts as a cushion and entirely prevents the clay from being consolidated. If, however, the space is increased, the clay must be increased in stiffness sufficiently to prevent it from readily exuding. It will therefore be seen that it is not an easy matter to construct a press possessing all the necessary qualities of even pressure on all parts, rapid action, and allowing of homogeneous distribution of the clay in the box, at the same time capable of releasing the finished ware without damage or delay. Innumerable methods and patents have been adopted. Many of the machines are very costly and entail a heavy outlay to the manufacturer, who often finds to his chagrin that he has a white elephant on his hands. Many such may be seen lying in sheds up and down the country in various factories, and it is the duty of every practical man to look with caution at the construction and working of these machines before he commits himself to such serious outlays as some of them entail.

BEFORE ENTERING INTO THE PRINCIPLES of a few types of presses adopted, it will be well to state first the general principles necessary to their successful working.

(1) It will be found that the drier the clay, the easier it is to work. This is opposed to the experience with regard to hand-pressing or moulding. In this case the softer the clay the easier it is to manipulate. While, however, it is true that the drier the clay the easier it can be formed, it must be noted that if the clay itself is quite dry there is absolutely no cohesion and the article falls to pieces in handling.

It will also be found that in proportion as the clay is more stiff, so the difficulty of releasing the imprisoned air in the box will be increased. If the clay is plastic it easily coheres, and unless the release of the air can be effected round the plunger before the pressure comes upon the clay, it will remain permanently imprisoned in the mass, and when the expansion of this air takes place in the firing, fine cracks are sure to result. Not only so, but inasmuch as the clay fills that part of the die-box last from which the imprisoned air last leaves, this part will have the least pressure and will therefore shrink more. It is therefore very important that the imprisoned air should be released equally in all directions from the sides of the box. From this it will be seen that the form of the stiff 'dump' of clay placed in the die-box should have careful attention. If it is too small in the area, undue pressure will be required to force in into the sides of the box. If it is hollow upon face so that the edges of the clay touch the plunger all round before the centre, the imprisoned air will have no opportunity to escape. If it is dissimilar in form to that of the finished tile the pressure exerted by the plunger will be irregular and the shrinkage uneven.

IT IS ALSO A FACT that the fatter the clay the more sensitive it is to any irregularity of pressure; for instance, if a small sphere of clay is placed in a square die which it nearly fills, as the plunger descends it causes the greatest pressure in the centre, and though the clay may be forced into the corners of the box, the fired tile will be certain, in the case of fat clays, to show an untrue edge. The thicker the mass the more difficult it is to transmit even pressure to all parts. It will be found by experiment that the pressure upon plastic clay is not easily transmitted from the surface to the centre, and this is more evident in proportion to the fatness of the clay. If even layers of parti-coloured clays are compressed in a die, the surface of the plunger being deeply corrugated, it will be found that the distortion of the layers will become less and less towards the centre, thus demonstrating the fact that the pressure is not evenly transmitted.

The softer the clay, the greater is the difficulty experienced in releasing the ware after formation, and the greater the danger of distortion in removal.

It is also worth notice that the fitting of the plunger requires careful attention, not only with regard to the release of the air during the descent of the plunger, but also the re-admission of air when the plunger rises. Unless there is an opportunity of this admission, a vacuum is set up and suction caused within the box. This is not a matter of so much importance in the production of flat tiles, but in the case of heavy mouldings and angle beads, it is likely to distort the ware and cause adhesion to the plunger. In reference to this matter, it will be found desirable in all cases to induce more adhesion relatively to the bottom die as compared with the plunger, so that the finished tile may more easily release itself from the latter. This may be accomplished by lubricating the plunger most.

THERE ARE VARIOUS TYPES OF PRESSES by which clay may be formed into tiles; all of them however consist of three chief parts.

1. The box or mould containing the clay.
2. The plunger or die which compresses the clay into form.
3. The screw or lever giving motion and pressure to the same.

The dies may be made in various ways. If the clay is extremely soft, it is quite possible to produce good tiles in plaster. In this case, however, free egress is required for the excess of clay, otherwise the plaster dies are easily broken. If stiff clay is used metal dies are necessary, and these are so cheaply produced in the present day that there is little need of recourse to plaster even for the manufacture of small quantities. The method of electro-typing can be used with care, and produces a much sharper and clearer impression than can be obtained by ordinary cast brass dies. By the former method the back of the electro-type requires to be made good with type metal, or other hard alloy. The chief objection to this plan is the tendency of such metal to swell with pressure, thus causing the die to stick in the box. Sometimes this is obviated by encasing the sides of the die in brass. The escape of air from the die is of more importance than almost any other question, hence the rate at which the plunger descends has much to do with the amount of air release required, because if the plunger descends more rapidly than the air escapes, the clay cannot be consolidated and the air inevitably becomes entangled with it. Hence the plunger must be smaller than the box in proportion to the speed of the machine and the softer the clay the more of it will exude under the pressure.

IN PROPORTION AS THE SPACE for the air release is increased the clay must be stiffened to resist the additional pressure. If the clay exudes from the box as quickly as the plunger descends, no pressure will be exerted upon the clay. The space from between the plunger and the box must be just sufficient to allow of air to escape easily, but not enough to let the clay escape. This at once explains the reason for working the clay stiff instead of soft. By this method the stiffer the clay the more force it requires to make it escape. It is well also to note that the air may be often released from the die-box by exerting a double pressure, the first slightly and the second more powerfully, the first allowing the air to escape before the effect of the last compression has produced this result. It must also be pointed out that there are two methods of compression:—

1. By means of shock or blow, amounting almost to a concussion.
2. Compression by a steady and gradual pressure.

It will be found that different bodies act differently in regard to these methods, and especially in the formation of bricks and quarries from shales, or from more plastic clays. Attention to these details will greatly affect the opportunities of success.

The adaptation of these principles to the production of dust-tiles requires some modifications which must be dealt with in a subsequent chapter.

LONDON'S NEW MAIN DRAINAGE.

A SCHEME IN WHICH THE BRICKMAKER WILL BENEFIT.

A CORRESPONDENT writes:—"At a meeting of the London County Council on December 5th, it was decided to at once expend the sum of £1,250,000 on the enlargement of the sewer north and south of the Thames.

For a long time past serious complaints have been made of the insufficiency of the main sewers in various parts of London. The difficulties attending the disposal of the sewage of a population of nearly five millions are among the greatest that any public body has to contend with, and a great responsibility rests upon the London County Council in dealing with the drainage of such a vast and densely populated area as that of the County of London. The capital cost of improving the main sewer during the last fifteen years has amounted to £1,143,402. The present system was established about forty years ago, and in view of the remarkable growth of London, it seems clear that the Council should, without delay, undertake works of an extensive character to cope with the present and prospective requirements.

Up to the year 1815, it was penal to discharge sewage or other offensive matters into the streams or the old natural water-courses. Cesspools were regarded as the proper receptacles for house drainage, and the streams as the legitimate channels for carrying off the surface waters only.

As population increased, this old system had to be suspended, and in the year 1847 the first Act was obtained making it compulsory to drain houses into the streams which discharged directly into the Thames. This state of affairs gave rise to such serious complaints that the Metropolitan Board of Works was formed, with the object of preventing the sewerage entering the Thames, and the late Sir Joseph Bazalgette was instructed to prepare a scheme, with the result that main sewers were constructed north and south of the Thames, with large precipitate tanks at Barking and Crossness. The sewage has been chemically treated since June, 1892, and the annual expenditure for the treatment and disposal of the sewage of London at these outfalls amounts to £150,000 per year. The works now proposed to be carried out on the north side of the Thames are as follows:—

New outfall sewer, Old Ford to Barking ...	£620,000
New intercepting sewer, Paddington to Old Ford, and the separation of Isle of Dogs and Hackney Wick branches, including pumping engines	300,000
	£920,000

and on the south side of the Thames :—

New outfall sewer, Deptford to Crossness ...	£427,000
New high level intercepting sewer, Dulwich to Crossness	784,000
Engines, &c., at Crossness	89,000
	£1,300,000

To briefly summarise the present position of the whole question, it may be stated that the main drainage system was constructed to serve 3,450,000 persons, with an average water supply of 31¼ gallons per head, whereas it now serves 4,700,000, or 36 per cent. more persons with a water supply of from 36 to 40 gallons per head. The population is increasing at the rate of 400,000 persons in every ten years, and will in all probability amount to a total of 7,000,000 within the County of London, when it is fully built over. The first part of these new works to be commenced will be two new 9ft. high-level sewers between Alby Mills and Barking—total length, 4½ miles ; estimated to cost £600,000, and extra works, £125,000. The second part will be a new outfall sewer, 11ft. 6in. diameter, between Deptford and Crossness, estimated to cost £500,000.

Intermediate sewer north of Thames	£770,000
Additional pumping stations	£120,000
New sewer, Crossness and Deptford	£520,000
„ „ Deptford to Battersea	£300,000

Making a total cost for both sides of the river of £2,947,000. The total works will take six or seven years to complete, and an enormous quantity of bricks of various kinds will have to be utilized.

THE HISTORY OF TILE MAKING.

The makers of tegulæ or tiles, after the Roman type, are frequently mentioned in the twelfth century, and in 1289 we find that the clay thrown up when the moat of The Tower of London was widened was sold to tilers, who manipulated in East Smithfield, and produced for seven years upwards of seven pounds annually. In 1443, that tiles might supersede thatch and prevent fire, a by-law was passed by the Corporation of Reading ordaining that no barber in that town should keep his shop open or shave any man after ten o'clock between Easter and Michaelmas, nor after nine from Michaelmas to Easter, except he be a stranger or town worthy, upon pain of being fined 300 tiles (*tegulas*) to the Guildhall, to be received by the cofferers. Instances of the payment of the fine are recorded in the town annals. Before tiles were made in England they were a Flemish importation, under the titles of channel, rug and paving tiles, and the first workmen are said to have been Flemings. It was for the decorative tiles of Thornton Abbey that the first material is recorded as having been purchased to colour them with (A.D. 1313). Essex and Suffolk have the earliest bricks, and moulded bricks were in extensive use in the fourteenth century, when they were priced at 7s. per 1,000. —*Architect.*

A Roman Villa has been discovered in a field near Arno's Vale Cemetery, Brislington, Bristol. It has been a good specimen of the Roman country house of the third century. Near the centre of the field there is exposed a considerable portion of the tesselated pavements of the rooms of the villa; these are composed of small cubes of red tile and blue and white stone set in cement, and arranged in geometrical patterns. There have also been found some common flat Roman bricks, 11in. square and 1½ inches thick.

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THE BRITISH CLAYWORKERS' MUTUAL INSURANCE CORPORATION, LTD.

A MOST SATISFACTORY YEAR'S WORK.

THE First Annual General Meeting of the above Corporation was held at the Offices on December 15th, 1899, at 3 o'clock in the afternoon. The Chair was taken by Mr. J. C. Hill, and the other Directors present were Mr. Alderman Blades, J.P., Mr. E. P. Collier, J.P., and Mr. W. B. Hughes, together with Mr. H. J. Cobbett (of Messrs Aylward & Cobbett), Solicitor, and Mr. H. Greville Montgomery, Secretary.

The Secretary having read the notice convening the meeting,

The CHAIRMAN in moving the adoption of the report, first explained the reason why the meeting was held in December. According to the Articles of Association, the accounts had to be made up for 15 months, but it had been thought advisable, as most of the premiums became due yearly on July 1st, to have the balance sheet made up to June 30th each year, as this would greatly simplify the accounts of the Corporation. In so far as their work was concerned, he thought it would be agreed that the year had been a most satisfactory one.

It would be noticed that a large reserve had been made for outstanding claims, and, as a matter of fact, the settlement of claims to date showed a considerable balance in favour of the Corporation. A reserve had also been allowed for unexpired premiums, and upon this also a saving had been effected. The managing expenses were extremely low, in fact they were purely nominal, while the Directors had taken no fees for their services whatever, the amount shown in the Balance Sheet being only for travelling expenses.

The Law Charges were also very low. Many of the accidents had been settled by the solicitors of the Company, and a great deal of work had been incurred by them in adjusting claims. The Auditors' work, too, had been very thorough, the Company's accounts for the first year had naturally necessitated the bestowment of a large amount of labour and care, for which the Auditors had charged most moderate fees.

The year's working had resulted in a profit of £689 18s. 4d., which, considering the low rate at which the risk had been taken, he considered a very satisfactory balance indeed. This did, however, not arise from their having had but few claims to meet, as would be seen from the following synopsis of accidents:—

Deaths	6
Accidents from machinery	47
Accidents in clay-hole	10
Miscellaneous accidents	88
Total number reported	151

A great many of these miscellaneous accidents were caused by boys getting their fingers in presses. This, although disobedience in many cases, the Act might not recognise as "wilful," and they had adopted a policy of settling these claims without raising legal quibbles—a course which he confidently hoped would give satisfaction to the shareholders. Where a *bonâ-fide* accident had occurred they had, whenever possible, taken a liberal view of the matter, and paid the injured person more than they need legally have done, in preference to taking the case to the courts, and squandering the shareholders' money in law costs. Only in cases where there was no legal liability had they ventured to contest the same. In doing this they were endeavouring to act more as a Friendly Society than a Limited Liability Company, for they, the shareholders, knew that when the men were treated badly, whether directly, or through an Insurance Company, they became dissatisfied and an uncomfortable state of enmity was set up between the employer and the employed.

Their present strong position arose more from the fact that the whole business had been worked at a minimum of expense. It would certainly not have been possible to do the business at the price, if the ordinary expenses of an Insurance Company had been incurred. There was no doubt that many Insurance Companies had intended making a very good thing out of the Workmen's Compensation Act when it first came into force. He had been quoted anything between 15/- per cent. and 30/ per cent., until finally one Company came down to 12/- per cent. Now that Company was going all over the country offering to accept insurances at 5/- per cent., and in some cases even at 2/6 per cent. It was a sure thing that if they, with their low expenses, could not take the risk at less than 7/6 per cent., other Companies could certainly not do it for 5/-. So that the object of these rate-cutting Companies was plainly to break up the Clayworkers' combination by offering brickmakers ridiculously low rates. He hoped that no brickmakers would give support to such Companies. What they had to do was to keep to the price which they had proved to be a fair one when every other Company was charging high rates, and to "sit tight." They had not tried to under-cut rates, nor to compete with those Companies who where doing so, and so long as they had the support of the trade they had nothing to fear.

Notwithstanding the competition of the rate-cutting Companies, they had not lost more than 7 per cent. of those who insured with them last year, which was a fine tribute to the loyalty of the trade. This had of course been more than made up by new business. If the whole of the trade would only rally to the support of their own Company, which was promoted, and was being conducted entirely in their own interest, the results would be astonishing. (Cheers.)

The CHAIRMAN then moved the adoption of the Report and Balance Sheet.

Mr. E. P. COLLIER, J.P., in seconding, said, that he would like to remark with respect to the disposal of the balance, that they were writing off the whole of the preliminary expenses of the Company, and carrying £200 to the Reserve Fund, besides having a balance of £48 1s. 7d. Now, it might occur to some, that the coming year might not be so good as the past had been, but he would point out that the item of Preliminary Expenses would not trouble them next year. They might have followed a "penny wise and a pound foolish" policy, by paying a larger dividend on the shares, or greatly reducing the premium, but it was generally acknowledged that the present rate was a very fair one, and the low rates quoted by the under-cutting Companies were admitted to be only temporary, and done with a view to returning to the former high rates as soon as their competition was removed. He considered it a foolish thing for brickmakers to accept these small quotations under the circumstances. It was his opinion that 12s. per cent. was as low as the ordinary Insurance Company could accept the risk at, and they would not be able to do it for less were it not for the economical system upon which their Company was worked.

Mr. Alderman Blades, J.P., and Mr. W. B. Hughes supported the resolution.

The CHAIRMAN then stated that Messrs. Collier, Hill, and Montgomery would retire from office, and being eligible, offered themselves for re-election.

Mr. F. JEWSON, J.P., in proposing the re-election of the above Directors, thanked the Board for their past services, and said it was his opinion that a good year's work had been accomplished. He felt sure that those who had studied the question at all, would agree with him that the Report and Balance Sheet were quite satisfactory.

For his part, he would never insure in a Company which, in the settlement of its just claims, created ill-feeling between him and his men, and he thought that the policy adopted by the Directors would be entirely satisfactory to all the shareholders.

With reference to the expenses, he added, that no Insurance Company would work without a profit, and by insuring elsewhere brickmakers would pay this profit to other people, whereas by insuring in their own Company the profits would come back to them.

The result of the year's work, in his opinion, showed that the Directors gave a great deal more time and attention to the Company than most of the shareholders were aware of.

Mr. J. J. ROBSON, seconded the resolution. He thought that the wise policy of the Directors was plainly justified by the successful result. He was sure the shareholders were thankful for the trouble the Directors had taken to carry out the work of the first year so successfully. The re-election was carried unanimously.

With the usual votes of thanks the meeting was concluded.

Subsequently an Extraordinary General Meeting of the Company was held, at which the following resolution was proposed and unanimously carried:—

> That the Articles of Association be altered in manner following:—
>
> (*a*) Article 44 by the omission of the words "in the month of November."
>
> (*b*) Article 103 by the substitution of the words and figures "30th day of June" for the "30th day of September."

This resolution was subsequently confirmed at a second Extraordinary Meeting held on Friday last, the 12th inst.

BRITISH CLAYWORKERS' MUTUAL INSURANCE CORPORATION, LTD.

◆

FIRST ANNUAL REPORT.

THE Directors have pleasure in submitting their First Annual Report and Balance Sheet, from which it will be seen that the affairs of the Corporation are in a very satisfactory condition.

The amount received on account of premiums was £2,947 11s. 8d., and the claims paid amounted to £779 2s.

After making ample reserve for outstanding claims, which are estimated at £482 16s. 1d., and carrying forward the sum of £376 1s. 9d. for unexpired risks, there is, after debiting expenses of management, law charges, cost of printing, stationery, etc., a balance remaining of £689 17s. 4d.

The Directors have already declared an interim dividend for nine months at the rate of 10 per cent. per annum, which has absorbed £112 16s. They therefore propose to write off the whole of the preliminary expenses, as below, and to deal with the ultimate balance as follows:—

	£	s.	d.
Preliminary Expenses	291	7	9
Three months' dividend	37	12	0
Reserve Fund	200	0	0
Balance forward	48	1	7
	£577	1	4

It will be noticed that the Corporation has been able to carry on its business without touching the Called-up Capital, which amounts to **£1,513 0s. 0d.** This has been invested in Consols bearing interest at 2¾ per cent.

Seeing that few Shareholders doubted but what the £1 per share paid up would have been utilised in conducting the business of the Corporation, to say nothing of the anticipation of subsequent calls being made, the Directors consider the position of affairs eminently satisfactory.

The Directors, with the sanction of the General Meeting held in May last, decided to allow to all policy holders renewing their insurances for 1899-1900, a reduction off their premiums equal to 10 per cent. on the amount paid the previous year. This amount will, therefore, appear in next year's balance sheet.

By the Articles of Association it is provided that the accounts be made up to the 30th of September in each year. As, however, the bulk of the policies become renewable annually on July 1st, it has been considered advisable, in order to save complications, to have the accounts made up to the 30th June. This has already been done, and the necessary resolution to alter the Articles in this respect will be proposed at the General Meeting.

In accordance with the Articles of Association the following Directors will retire from office, and being eligible offer themselves for re-election:—Messrs. Collier, Hill, and Montgomery.

REVENUE ACCOUNT,

From 21st June, 1898, to 30th June, 1899.

Dr.

	£	s.	d.	£	s.	d.
To Claims Paid including Expenses and Medical Fees	779	2	0			
,, Reserve for Outstanding Claims	482	16	1	1,261	18	1
,, Management Expenses, including Commissions				363	0	0
,, Directors' Expenses				24	5	0
,, Law Charges & Auditors' Fee				145	0	0
,, General Charges, including Printing and Stationery and Policy Stamps				120	3	4
,, Provision for Income Tax				22	0	0
,, Balance Carried to Balance Sheet				689	17	4
				£2,626	3	9

Cr.

	£	s.	d.	£	s.	d.
By Premiums	2,947	11	8			
Less Reserve for Premiums Unexpired	376	1	9	2,571	9	11
,, Income from Investment and Deposit Account				54	13	10
				£2,626	3	9

BALANCE SHEET,

At 30th June, 1899.

Dr.

Liabilities.

	£	s.	d.	£	s.	d.
Share Capital.						
Authorised:—						
10,000 Ordinary Shares of £10 each	100,000	0	0			
Subscribed:—						
1,423 Ordinary Shares of £10 each, £1 paid				1,423	0	0
Amount received in advance of calls				90	0	0
				1,513	0	0
Reserve for Premiums Unexpired				376	1	9
Reserve for Outstanding Claims				482	16	1
Debts due by the Company:—						
Premiums received in advance	162	11	6			
Sundry Accounts (including Commission, Law Charges, and Auditors' Fee)	524	5	2	686	16	8
Revenue Account:—						
Balance from Revenue Account	689	17	4			
Less Interim Dividend of 7½% on £1,504 paid 1st June, 1899, free of Income Tax *(See Note)*	112	16	0	577	1	4
				£3,635	15	10

Note.—The Interim Dividend was paid on all Shares alike and not calculated from dates of Payment on Application and Allotment.

Cr.

Assets.

	£	s.	d.	£	s.	d.
Investment at Cost:—						
£1,801 15*s.* 2*d.*, 2¾% Consols				1,996	17	0
Office Furniture				21	16	4
Preliminary Expenses				291	7	9
Debts due to the Company:—						
Premiums and Adjustments of Premiums not received	207	0	4			
Interest on Investments (accrued)	21	18	7	228	18	11
Cash at Bankers:—						
On Deposit Account	1,000	0	0			
On Current Account	96	15	10	1,096	15	10
				£3,635	15	10

We certify that we have examined the above Balance Sheet and Accounts. The Reserve for Outstanding Claims has been certified by the Company's Solicitors and Secretary, and subject thereto the Balance Sheet is in our own opinion full and fair, and properly drawn up to exhibit a true and correct view of the state of the Company's affairs as shown by the Books.

W. B. PEAT & CO.,
Chartered Accountants.

Lothbury, London, E.C.
28th November, 1899

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AUDITORS:

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THE BRICKBUILDER.

NOTES BY F.R.I.B.A.

Wanted: Non-porous Bricks. THE Report of the Royal Commission appointed to enquire into certain aspects of the London water supply problem has at length been finished, and issued to the public. This Report is not only of metropolitan interest but contains much that is of indirect value to clayworkers throughout the country. A main point in it is the proposal to establish bacteriological stations near the filter beds of the water companies. By inference porosity of materials used in connection with the places of intake are implicated. In fact, it is now beginning to be recognised, that, what we have before indicated in the *British Clayworker*, the relative power of bricks to harbour bacteria is a factor to be reckoned with in connection with the employment of bricks for waterworks' purposes. It is not that any other substance has been proved to be better than bricks for that purpose; indeed, all natural stones hitherto employed, if we except the best granites, may be discarded in preference. But in view of the ever-increasing demands of the Local Government Board, backed up by its scientific advisers, bricks for waterworks' purposes will assuredly have to be more and more carefully rendered impervious. Not only that, but a state of absolute non-porosity for a given term of years seems to be required in the near future. Very few brickmakers will care to give a guarantee to that effect, no doubt, but those who do will be most favourably considered. We offer no opinion on the matter beyond saying that the brick that has been well and honestly burned, and fulfils the modest requirement that it shall for some time be fairly impervious will be preferred to the make-believe material—no matter what the colour be. Comparative non-porosity means a good sanitary brick, and that is all that can be asked for.

Stucco *v.* Bricks. WE have noticed an interesting variation of late in the method of adorning that most peculiar of dwellings—the "eligible suburban residence." "Cathedral glass" in gold frames has, evidently, not proved sufficiently attractive to the up-to-date house-hunter, so in addition to a most imposing front gable, each of these terrace houses is now furnished, high up under the gable, with a marvellous piece of stucco work that should satiate even an embryonic Michael Angelo. In order that variety should be properly consulted, each of these wonderful works of art is different to its neighbour, and you have to pass by several houses before you see a duplicate of any one of them. The boldness of this stucco (we do not like to call it by its right name "cement work") is its charm. The arms of celebrated families are the principal themes of the work—foreign families of course. On one of these we see a coat of arms that would do justice even to the palace of a Medici, or a Bourbon. The next bears the barbaric simplicity of the arms of a faithful Brandenburger—and so on. A row of these dwellings, if the stucco counts for anything, should contain nothing short of dukes and princes. But all this picture is rudely disturbed if you pass by shortly after the work has been put up. Perchance the rotten bricks underneath will be revealed by the cruel hand of time (some of the stucco having fallen). And if you see the wall of one of these gables before the application of the ducal arms and coronet, you notice that most interesting of all building materials—the brick of the suburbs. At first we thought the stucco was for ornament, and to gratify vanity; now, alas, it seems to us rather to be put up to hide the awful bricks employed.

Stencilling St. Paul's. ST. PAUL'S CATHEDRAL has, in recent years, come into its fair share of criticism so far as the internal "decorations" are concerned. But we very much doubt whether any criticism could be sustained with greater force than that which has been offered during the past few days. Wren, when he built the cathedral, undoubtedly relied on the broad faces of stonework in the interior for his prime effect. It was doubtless never intended by its author that the interior should be turned into a gaudy display of glitter and tinsel. Yet, we have lived to see not only the severe treatment of the interior tampered with, but the attributes of the café introduced. A stencil-plated interior! And, this done in the name of Art! But the protest has proved too much, and we notice that an attempt has been made to scrape off the stencilling. Unfortunately for the stone on which it was put, the pink paint has, however, sunk in too far, and now the stone is being chipped and chiselled to get rid of it. The much despised mosaic is to cover the inglorious effects of that and the stencilling. How much better it would have been to have introduced panels of terra-cotta if red and pink was a necessity for the artistic treatment. There is, at any rate, no sham about that. To those who know what St. Peter's at Rome is in the interior, and the cathedral of San Francisco in Madrid, as examples of what the two chief Roman Catholic cathedrals are like; to those who have also had the opportunity of seeing the interiors of the grand cathedrals of St. Isaac, in St. Petersburg, and St. Saveur, in Moscow, as representative of the Greek Church; and the interior of St. Sophia in Constantinople, this tame decoration of the metropolitan church in England appears to be exceedingly weak. However, we will not labour the point. We have seen all these cathedrals mentioned and many others, and if architects in England are ever to understand the way of adorning the interior of a house of worship, they should make the same pilgrimage themselves.

Architects' Commissions. WE have received a circular from a brick and tile firm, which, after stating that their own goods are "second to none," promise that if it is our custom to take 2½ per cent. they will be pleased to allow it. That is, if they deal with architects who despise bribes, well and good; but if the architect wants a bribe they will give it. We suppose that while there are architects who freely accept commissions, the practice of offering them will continue; but we would like to see the whole system swept away, for it is as reprehensible as it is undignified.

THE BUILDING TRADES' GIFT TO THE NATION.

CLAYWORKERS' SECTION.

The Building trades of this country are very laudably setting to work to build, as a national gift, a convalescent home and home of rest for discharged, and probably permanently invalided, soldiers, as an outcome of the present Transvaal war. The scheme was originated by the well-known architect, Mr. Edwin O. Sachs, whose labours in connection with the Fire Prevention Council are well known to our readers. The following form the Executive :—Messrs. Fred. R. Farrow, F.R.I.B.A. (for Hygiene), F. Hammond, F.R.I.B.A. (for Equipment), Ellis Marsland, District Surveyor (for Construction); Hon. Advisers—Sir John Taylor, K.C.B., F.R.I.B.A., H.M. Office of Works, Messrs. Thomas Blashill, F.R.I.B.A., late Supr. Architect L.C.C., and Arthur Cates, Past Vice-President R.I.B.A., late Surveyor, the Crown; and Stewards representing important branches of the trade. Hon. Secretary—Mr. F. Rider.

It is more than probable that the whole of the material required will be presented by different firms manufacturing specialities, and Clayworkers will certainly not be backward in doing their part in contributing to so worthy an enterprise.

Lord Pirbright has generously given an extensive freehold site at Bisley, and the Soldiers' and Sailors' Help Society has undertaken the management and maintenance of the homes, under a scheme initiated by Princess Christian, who has formed a special Homes Sub-Committee to attend to this matter. This Sub-Committee, it should be added, comprises, besides Princess Christian, Princess Henry of Battenberg, the Duchess of Connaught, Lord Pirbright, Lieut.-General Geary, Lieut.-Col. Gubbings, Major Martin, and Major G. E. Mallet. The Duke of Connaught, Earl Derby, and Lord Pirbright have consented to act as trustees to the Homes.

The extent of the assistance to be rendered by the building trades will be the erection and equipment of six cottage homes, comprising in all one hundred beds, together with the necessary offices, and a large recreation room and workshop.

There is, perhaps, one feature regarding the gift which may particularly appeal to the building trades, namely, that the discharged soldier who can show that he has for some years been working in the building or allied trades prior to service with the colours, or having been connected with these trades whilst a Reservist, will have precedence when a selection has to be made for a place in the Homes in question, so that the Homes will always be identified with the interests of the donors.

The following will give an idea as to the materials required in our branches of the trade. The quantities given are for One Home, and it must be remembered that there are six homes to be provided for :—

125 yards (cube)	...	Thames or pit sand.
50 yards (cube)	...	Clean ballast for concrete foundations and over site.
50 yards (cube)	...	Grey stone lime.
50 tons ...	...	Portland cement for concrete in foundations, over site, and in rough cast.
2 yards (cube)	...	Clean washed pebbles, for rough cast.
No. 100,000	...	Bricks, including 25,000 in red facing bricks.
500 feet (run)	...	Plain moulded red bricks for chimney stacks, Chimney terminals, &c.
100 feet (run)	...	Ridge tiling, terminals.
100 yards (sup.)	...	Encaustic or other fancy tile flooring for interior.
250 yards (sup.)	...	6 × 6 red or black-and-red or black-and-white tiling for paving under verandah.
20 yards (sup.)	...	Mosaic flooring for hall.
500 feet (sup.)	...	6 in. (or 4 in.) white glazed tiling or opalite at back of sinks, around baths, and in w.c.'s and lavatories.
500 feet (run)	...	3 × 12 twice throated Portland stone (or terra-cotta) coping.
150 feet (run)	...	4 × 10 sunk, weathered, and throated stone (or terra-cotta) sills, with stooled ends.

The principal demand at the moment is for facing bricks, the following being required :—

25,000 facers for each home	... . =	150,000
10,000 facers for each service block	.. ... =	30,000
20,000 facers for the recreation house	... ... =	20,000
Total	... ..	200,000

We are glad to announce the following contributions to date :—

Mr. James Brown—Moulded Bricks and Ornamental Panels for the whole of the buildings.

Messrs. S. & E. Collier (Reading).—The entire Ridge Tiles.

Messrs. Diespeker & Co.—The entire Mosaic Flooring for Lobbies, Halls, Lavatories, etc.

Messrs. Doulton & Co.—2,000 feet of Drain Pipes, and Yard Gullies for the six Homes.

Messrs. Eastwood & Co.—750,000 Bricks for the six Homes.

Messrs. J. C. Edwards (Ruabon)—9,000 Red Pressed 6 in. by 6 in. Flooring Quarries.

Messrs. Hilton, Anderson, Brooks & Co.—50 tons of Portland Cement.

Mr. George Jennings (preliminary)—Sanitary Fittings for one Home.

Messrs. Thos. Lawrence & Sons (Bracknell, Berks)—25,000 Red facing bricks, and 500 feet of moulded bricks.

Messrs. Wm. Lee, Son & Co.—25 tons of Portland Cement and 50 yards of Lime.

Messrs. Macevoy & Holt (North Fleet)—50 tons Cement.

Messrs. Maw & Co. (Shropshire)—250 yards super. Tiling for paving.

Mr. Jabez Thompson (Northwich, Cheshire)—1,000 Patent Brick-woods.

Messrs. Towers & Williamson (Grantham)—Clinkers for workshops and stable floors.

Messrs. G. Tucker & Son (Loughborough)—Chimney Pots for all six Homes.

Messrs. Twyfords—The Sanitary Fittings for one Home.

Messrs. Geo. Woolliscroft & Son (Hanley)—The Roofing Tiles for one House.

From those who cannot contribute in kind, money payments will be welcome, and if our readers care to send donations to us we will forward them to the proper quarter and duly acknowledge them in this journal from month to month. Contributions from workmen from sixpence upwards will be thankfully received.

The following donations have already been promised in the Clayworking Section :—

	£	s.	d.
The Burham Brick Co., Ltd. (per W. Porter, Esq.)	100	0	0
Mr. H. Greville Montgomery	25	0	0
Mr. J. B. Tombleson (Barton-on-Humber) ...	5	0	0

Communications relating to Clayworkers' gifts may be addressed to us, or to The Executive, Building Trades Gift, 1, Waterloo Place, Pall Mall. Cheques should be crossed "Lloyd's Bank (Building Trades Gift)."

ELASTIC SLAG-WOOL BRICK.

MINERAL wool is, for equal efficiency, the cheapest fire-proof non-conductor or insulator of heat, cold and sound that can be devised, says a writer in the *Iron and Coal Trades Review*. Hence, its most important uses lie in the domain of applications where large quantities are required, and where the use of asbestos would be simply prohibitive on account of its cost. Thousands of tons of mineral wool have been applied in covering pipes, in lining the floors of railway passenger cars, and in deafening roofs, floors and walls of first-class dwellings. Its quality has been gradually improved, and its annual production in America, according to the "American Manufacturer"—including that of the various grades that are called rockwool—amounts now to about 14,000,000 lbs. Though this quantity represents a large volume—over a million cubic feet—it amounts only to small fraction of what the consumption would be if the material were produced entirely free from objectionable impurities, and if devices were introduced for applying it in a more practical manner than to stuff it in its loose state into the spaces that are to be lined, which, in many cases, involves the application of sheathings and jackets that cost more than the wool itself.

The term elastic mineral-wool brick will be more readily understood after considering the disadvantages of applying the material for architectural purposes in its loose state.

In deafening walls and partititions with the loose wool—usually to a thickness of from 2 to 4 inches—the spaces that are to be filled with it have to be boarded or lathed from the floor upwards, a foot or two at the time, as the work of stuffing the wool in progresses. This kind of work is not only tedious, but also unreliable, inasmuch as it is hardly possible to produce in that way a deafening of either uniform density or of sufficient density to withstand the effects of vibration; and without that the deafening is apt to settle considerably in the course of time. Now suppose that the wool is applied in the form of ordinary bricks, of suitable size, of sufficient consistency to be handled without breaking up, and also sufficiently elastic to be pressed together so tightly as to leave no air spaces between them—and then a job can be done that will be satisfactory in all respects. In laying such bricks no mortar or binder is required. If they are laid close to the outer wall or partition, from joist to joist, pressing them in rather tightly, the courses may be carried up to the ceiling without inside support, and, by nailing a few strips across from joist to joist, the bricks may be kept permanently in place without an inside lining.

As regards the most suitable density for a mineral-wool deafening, it is frequently claimed that the more air the material contains—or the lighter it is packed—the greater will be its efficiency as a non-conductor of heat, at least for ordinary temperatures. This can be easily disproved by making comparative tests with different grades of mineral wool of the same composition. If a fine grade is compressed to a somewhat greater density than a coarser one, so that it weighs more for the same volume, and, consequently, holds less of air than the other, it will still prove to be the more efficient of the two because its interstitial air is in a state of finer subdivision. There is, of course, a limit to these conditions, and that limit becomes overbalanced by the conducting capacity of the solid substance that holds the air in confinement. After many experiments in that direction, the writer has come to the conclusion that the insulating efficiency of mineral wool, as well as its elasticity or resistance to vibration and transient pressure, are directly proportional to its power of capillary attraction, or, in other words, to the amount of water than it can hold in suspense in the compressed state. According to this rule, a deafening of ordinary mineral wool—which is the only grade that is sufficiently cheap to be used extensively for walls, roofs, and floors—should weigh about 27 lbs. to the cubic foot in order to fulfil all requirements, whereas it is frequently claimed that a weight of from 12 to 15 lbs. is sufficient. But when the wool is compressed to the latter weight in a narrow vessel, it can absorb over three times its own weight of water when the vessel is immersed, which is more than it can hold in suspense after it is taken out; hence deafenings of that density are apt to settle, especially when they get wet, which may happen on account of accidental leakage during heavy rains, and in other ways. If, on the other hand, the wool is compressed to a weight of 27 lbs. to the cubic foot—equivalent to one-fourth of an ounce for a cubic inch—then it can only absorb somewhat less than twice its own weight of water, and that much it can hold in suspense without settling; and as to its elastic limit, it can stand a transient pressure of about 6 ozs. to the square inch, or 54 lbs. to the square foot, without permanent set, which is amply sufficient for a material that is only to be used for a deafening and not for support.

As elastic mineral-wool brick contains nothing but ordinary mineral wool, excepting about 2 per cent. of a mineral agglutinant, it will also be the most efficient when its weight comes near to the proportion just mentioned (¼ oz. per cubic inch). At that rate a brick of 9 by 4 by 3 inches will weigh nearly 1¾ lbs. Bricks of that size can be used as well for a 3 inch as for a 4 inch deafening; and the smaller the size the easier it is to make them. The weight may, of course, vary according to the fineness and specific gravity of the particular kind of wool that is used, but such variations are apt to remain within a range of 5 per cent. either way from the mean.

The agglutinant, or bonding substance with which the bricks are formed, is insoluble in cold water; and the bricks do not lose their form when they are immersed for two hours in hot water. The details of manufacture are fully described in the patent specifications. They are very simple, and can be carried out by unskilled labour.

The most salient feature of the process is the manner in which the wool is manipulated while it is in the moulds; and it is essential for the success of this manipulation that the wool should not be handled much before it is put into the moulds, as it is liable to be when it is packed in the usual way for shipment. Hence, the brick should be made at or near the mineral-wool factory, where the wool can be obtained in about the same condition in which it originally fell. As to cost, there is no doubt that the elastic bricks can be sold profitably at a price at which they will be cheaper to use, weight for weight, than loose mineral wool when it is compressed to the same density.

It goes without saying that mineral wool can also be formed by the same process into other shapes, such as sectional pipe coverings, moulded fittings, &c.; but the quantities that could possibly be placed for such applications—in competition with the many actively canvassed contrivances of a similar nature—are insignificant in comparison to the large requirements for those building purposes for which no other material is so well adapted.

TIMBER-BRICK HOUSES.

It has become quite fashionable for the modern architect to design houses in the sham Queen Anne style, and to utilise a fair amount of timber in the walls, the main structure, however, being of brick. If good timber were used there would not be much occasion for us to make these remarks. But, it is quite evident that the cheap-and-nasty style, no matter what class of building is contemplated, leads to the employment of so much green timber of atrocious quality, that the bricks are unfairly treated. In this instance we hold a brief for the bricks, and it is impossible for them to be satisfactorily joined to the timber to make a coherent whole if the timber is to be allowed to "season" in the walls of the building. The drying out of the sap during that process is fatal to the mortar or cement employed, and it is quite impossible for these latter to stand firmly under the circumstances. The result is that there is a strong tendency for the brickwork to be cracked, and, worse than that, a driving rain on the weather side of the building leads to damp interiors in spite of properly constructed damp-courses in the basement. The next process to remedy this state of affairs is the creation of a hollow wall, and suitable drainage beneath, but this is at best a sorry expedient as the interior has to bear the work at the cost of its being made smaller. Better to have spent a little more on the timber and have obtained good, dry, and seasoned material, when much of the defects mentioned would never have arisen. This class of house usually demands a fairly good face-brick, and these latter do not shine to advantage when so little care is taken of the timber, and it is distinctly prejudicial to the character of the brick.

"ALTERATIONS" OR "REBUILDING."

Not far from the spot where this is being written there is a marvellous house. It was quite of an ordinary type when first put up, and so remained for many years. Then the time seemed opportune, apparently, for converting it into something the precise nature of which is not yet even apparent, as the wonderful work is still proceeding. It was by no means a mansion house in the first place. First, the windows were framed with timber baulks, except the lower ones which were pulled out after the front wall had been supported. The basement and first floor were thus laid bare for public inspection—and they remained "lying in state," as it were, for some weeks. Meanwhile, the bricks in the upper portion of the building did not quite see why the timber should have its own way entirely, so, elegant cracks made their appearance in the brickwork. This did not dismay the builder, it rather encouraged him to renewed efforts. In revenge, however, he pulled down the flight of stone steps leading up to what was originally the front door, and thus exposed another large section of the interior. By way of retaliation, the cracks in the brickwork made themselves wider and wider. Then some loads of the most rotten type of brick ever seen in our experience were led to the spot. To stop the criticism of the older bricks present the builder then laid on a thick coating of mud over them—or is it cement? But, even the mud is rebellious and shows some fine, elegant cracks in prominent places. And, now we have been wondering whether it would not have paid the owner better to have pulled the old building down, and rebuilt it entirely, and with good bricks, rather than to have fallen into the error of tinkering.

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THE BRICKBUILDER.

NOTES BY F.R.I.B.A.

A Notable Brickbuilder

In the death of Mr. William Butterfield, the celebrated architect, brickmakers have lost a good friend. At a period when most other architects regarded the employment of brick in large public buildings as an impossibility, and an offence from an æsthetic standpoint, he upheld the nobleness of the material, and freely employed it in conjunction with stone. He, possibly, did more than any other single architect to educate his brethren in art up to this point, and he even prepared the way for the public understanding of what was, forty years ago, an abomination in their view. He was fond of colour in buildings, and, having the good sense not to overdo things, he never abused his predilections in that direction. One of the most notable examples of his art, the Guards' Chapel at Caterham Barracks, erected in 1886, shews how judiciously he could combine brick with stone, marble and mosaic. Bare, cold walls were not favourites of his. Amongst many other noteworthy buildings erected from Mr. Butterfield's designs are St. Augustine's College, Canterbury; Keble College, Oxford; Jesus College, Cambridge; All Saints', Margaret Street, Cavendish Square, London; and St. Alban's, Holborn. He was never a very enthusiastic admirer of all-brick public edifices, and in that respect did not so closely resemble Street as he might have done, but he undoubtedly effected a conversion of the majority of the all-stone partisans, not so much by words as by works, and in that respect, apart from his romantic conception of what architecture should be, he deserved well of the clayworking industry of this country.

Glazed Wall Tiles.

During the past week we have noticed several instances where it has been practically impossible for the wall-tiler to lay his work properly, owing to the glazed tiles employed not being of true geometrical pattern, and thus not fitting well together. Once a slight error of this sort is perpetrated, the discrepancy becomes magnified until broad cement joints between the tiles result, and the work is thereby rendered unsatisfactory. With a view to detecting the precise cause of this difficulty we have carefully regarded several adjacent tiles in a wall which seemed to be chiefly at fault, and the following are the conclusions we have arrived at, though they by no means apply to the best glazed wall tiles, nor to certain others which are entirely above suspicion. We make out that the difficulty arises principally from the edges, or one of them, of the tile, jutting ever so little above the general surface of the tile. This slightly projecting edge is formed at the expense of symmetry, and where a square tile (of the commonest type) has to fit in amongst its neighbours, it will be frequently found that owing to the want of being strictly rectangular, the joints will be somewhat wide at one end and narrower at another. The thickness of the ordinary glazed tile is not always the same throughout, and this, in spite of the most careful laying, sometimes leads to irregularities of surface of the wall face. These may not be so much noticed when the work is new, but often come out later. Our readers will readily understand that we are not referring to the best tiles, but to those in common use, and our point is that with moderate care in making, the difficulties we have pointed out can be easily avoided, and architects become thereby more completely satisfied.

Vegetation on Roofing Tiles.

One of the principal charms of roofing tiles is their power of frequently promoting vegetation of a low order, thus destroying the appearance of freshness which few people like to see now-a-days in buildings. The vegetation does not rise much above the surface of the tile, and may consist of lichens, mosses, or flat, clinging fungi. Certain tiles have a greater tendency to promote these growths than have others, and the cause is not far to seek. In testing the value of tiles from the point of view of their being able to withstand climatic changes, we frequently ascertain their relative porosity; and it may be noted that the more porous the tile is (*cæteris paribus*) the greater will be its tendency to vegetate. At the same time, convenient "foot-hold" is not the only property seized upon by the vegetation. The latter is, under certain conditions, able to extract a little nutriment, or at any rate some mineral substance, from the tile, and the composition of the tile is, therefore, a factor in the question. We have never heard of anyone deliberately planting vegetation of these kinds on tiles with a view to promoting definite results, but there appears to be no reason why that should not be done, and where the roof is already well "vegetated," and owing to repairs, or additions, the new work causes the whole to appear patchy, we think something in the way of artificial growth might be attempted. It is of paramount necessity, to prevent patchiness, to have the tiles of one kind, or make, and of one variety of tile-clay. The question as to whether vegetation promotes decay in the tile is to some extent an open one. By their decomposition certain lichens, &c., provide crenic and apocrenic acid, the most powerful destroyers of stone in existence, and the same may do some damage to tiles, though we do not believe that to be generally the case.

Temporary School Buildings.

We can understand certain American school authorities erecting temporary schools, to suit migratory populations, such as has recently been found desirable in the neighbourhood of St. Louis and Milwaukee, but it passes comprehension how a School Board not a thousand miles from London, can be brought to the expediency of doing such a thing. Yet that has come to pass. And the School Board in our mind's eye, situated in the vicinity of a large brick-producing country, seems to prefer the wood and corrugated iron structure to something more substantial. For within the past fortnight the Board have announced their intention of removing a certain school building from the site it at present occupies and putting it up elsewhere. There is no migratory population, to speak of, in the district, and the only conclusion we can come to regarding the matter is that the Board have adopted the "penny-wise, pound foolish" doctrine, and are merely staving off the moment when they will be compelled to alter their plans, and put up a good, substantial, brick building.

THE MANUFACTURE OF MAJOLICA.

No. X.—DUST TILES.

The method of making Tiles by compressed clay dust which has been slightly moistened, has now become so general for majolica that a few notes on the process seem to be necessary.

The alternative of filling the die box with pulverised clay slightly damped, has proved more successful than the attempt to compress very stiff plastic clay, but there are certain indispensable requirements for success. In all stages absolute uniformity is necessary, for unless the particles of dust are uniform in size the texture of the surface of the tile will be irregular. Unless it is uniformly damped, the porosity of some parts will be greater, and therefore in dipping will absorb more glaze. Unless the quantity of dust is uniform in the die box the tiles will vary in thickness. Unless the dust is distributed uniformly in all parts of the box the tiles will be thicker on one edge than on the other, and unless the tiles are uniformly dried, they will either crack or warp. It will therefore be seen that though it is true there are many advantages in the use of dust for tile making, such as the reduction of shrinkage and of warping as well as greater truth of form and sharpness of detail, there are many precautions necessary.

Besides these, certain disadvantages are inherent to the method. The material of the tile is less consolidated inasmuch as the dust particles adhere only at their points of contact. This causes the tile to be much weaker in the mass than the plastic tile where the smaller particles of clay fill up the interstices and make a solid mass.

The second disadvantage is that there is consequently imperfect exclusion of air from the mass of the tile, that is to say, that if made from similar body the dust tile will be considerably more porous than one plastic made.

Besides this, there is always the greater danger of much air being entangled among the dust, and immediately that the plunger enters the box this air is imprisoned so that it is quite impossible to consolidate the mass. This often causes longitudinal cracks resulting in the splitting or the flaking of the tile.

From these causes there is considerable risk in the use of dust made tiles for exterior application, especially if there is the least tendency to crazing as soon as the slightest moisture penetrates into the mass of the tile. The porosity prevents the possibility of any great resistance to the expansion which is sure to take place as soon as frost happens.

The only possible means to overcome such objections are to sufficiently increase the biscuit firing to allow of the material becoming much harder, and therefore stronger, or to use a mixing having a larger proportion of vitreous ingredients which tend to fuse the dust particles together.

This last method, however, can only be adopted at the expense of greater warping if the firing is carried to a sufficient temperature.

The methods of damping the dust also need careful attention if the loss is to be kept within small limits.

The old-fashioned method of scattering the dust upon the saturated plaster slab has many objections. This is especially so if the body is rich in ball clay, when the moisture is imparted immediately to the undermost layer and this portion of the clay dust becomes so wet that from its nature it does not easily impart the moisture to the upper layers. The result is that when mingled, there is a great want of uniformity in the dampness of various particles, and the tile when dipped will show over the whole of its surface, irregular nodules of glaze alternated with depressions of the surface, thus indicating that some parts are more porous than others.

It need not be pointed out that the fatter the ball clay used, or the larger the quantity in the body composition, the more difficulty there is in obtaining uniform dampness, because the non-plastic material tends, when in larger proportion, to divide up the plastic particles and thus gives an opportunity of passage of the moisture to them more readily. Any means, therefore, which allow of the moisture being brought into intimate contact with the clay particles in fine sub-division, is greatly to the advantage of the final result.

The method of a steam injection which impinges upon the falling dust has been in some cases carried out with success, as also the later introduction of the centrifugal dispersion of the dust, which is damped by jets of steam issuing from a circular pipe, and meets the dust as it falls.

These methods assume the grinding of the dry dust before damping. In some works, however, it is usual to damp the clay after preparation sufficiently for the purpose required, after which the clay is ground into dust of the requisite fineness by machines of special construction. As a rule it will be found that this plan gives the best results for majolica bodies.

Machine Presses.—The construction of all machine presses has in view the direct mechanical forcing of the clay into a given form without the intervention of manipulation. All such presses therefore consist of three parts: (1) The box or mould which contains the clay, and which regulates the form and size of the sides and bottom of the finished tile. This box may be fixed or moveable, that is to say, it can be withdrawn from its position directly beneath the plunger for purposes of examination, or of filling, being again pushed forward into its original place ready for the action of the plunger. (2) The plunger or die which by descending into the box compresses the clay into the necessary form and gives to the surface any ornamental relief or intaglio that may be desired. This plunger, while fitting sufficiently accurately the box into which it enters, must allow sufficient exit for the air which is displaced, in order that a perfect piece of ware may be formed. (3) The screw or lever which imparts the necessary downward motion to the plunger. The form of this part of the machine must depend largely upon the conditions of working and the nature of the material, For soft clay a direct lever action by which the plunger is brought down into the box at a single blow produces a fairly satisfactory result. For stiff clay or dust, especially if the area is somewhat large, this form, however, does not give sufficient pressure and the descending screw actuated by the heavy horizontal fly wheel above, can be made to exert a pressure of several tons and thus produce a perfectly solid piece of ware.

The pitch of the screw and form of the fly-wheel has much to do with easy and rapid working of the press. If the pitch is too rapid, the plunger will descend readily, but the return of the plunger to its former position will require some labour. It is a good plan to have the spokes of the fly-wheel of wrought iron, strong, but sufficiently elastic to cause a certain re-bound of the wheel after it has solidified the tile, thus greatly relieving the force which has been exerted in bringing the fly-wheel back to its original position. It is of course necessary in order to secure this result, that the bridge in which the screw is worked should be thoroughly rigid and solid, so as to resist the thrust of the plunger as it delivers its blow.

It will be noted that this plan tends to consolidate the upper surface of the tile more than the one beneath, inasmuch as the pressure is exerted first at that point, and it will be found by experiment that this pressure is not uniformly imparted throughout the under-layers. In order to avoid this objection it is usual with some form of presses to arrange the die-box so that the clay can be compressed simultaneously from below as well as from above.

The presses constructed to work automatically have been chiefly confined hitherto to the production of bricks, both in the semi-plastic and dust methods. They are built upon various principles, the relative merits of which are chiefly confined to their adaptation to special materials.

The condition of the clay from which bricks are formed, varies considerably more than is the case with the material used for fine tiles, on account of the fact that many kinds of bricks are produced from clays coming from pits in every variation of condition as regards moisture, size of grain, proportion of plastic contents and quantity of foreign matter, often including stones and gravel. Many of these conditions are entirely absent in the case of bodies used for tiles which are generally washed before pressing, or at least finely ground and sifted to uniform consistence. There appears, however, to be no reason why dust tiles should not be made by the method by which the dust or the plastic "dump" is delivered automatically into the boxes, a series of which are formed in the circumference of a revolving table or on some similar principle by which the empty box is intermittently brought under the plunger for filling and pressing while the full box is released from its position for the purpose of being emptied of its contents.

THE BUILDING TRADES' GIFT TO THE NATION.

CLAYWORKERS' SECTION.

In our last month's issue we gave full particulars concerning the Convalescent Soldiers' Homes, which the building trades are presenting to the country. Although active response, both in money and kind, is being daily made, much yet remains to be done before the Executive will be enabled to start with the building.

Contributions are still needed of red-facing bricks, cement and lime, and we hope that this reminder will be the means of bringing together the necessary gifts.

The scheme, which at the close of last month had been in progress for six weeks, has, through its Executive, received material, taken at cash prices, to the value of £12,500. There has also been received about £1,000 in cash. The value of the buildings as proposed by the scheme is £25,000, including drainage system, and electrical equipment.

Our readers will not forget that "He gives twice, who gives quickly," and what we want now, is for the work to be proceeded with *at once*, so that it may be of service at the earliest possible moment to our convalescent soldiers who may return from the present campaign.

The following are the contributions from Clayworking and allied trades to date :—

Albion Clay Co. (Woodville)—Intercepting Traps, Gullies, &c.

Mr. James Brown—Moulded Bricks and Ornamental Panels for the whole of the buildings.

Mr. Jos. Cliff (Leeds)—Complete Sanitary Ware for two Homes.

Messrs. S. & E. Collier (Reading)—The entire Ridge Tiles.

Messrs. Craven, Dunnill & Co. (Jackfield, R.S.O., Shropshire)—Mosaic Flooring for the halls.

Messrs. Diespeker & Co.—The entire Mosaic Flooring for Lobbies, Halls, Lavatories, etc.

Messrs. Doulton & Co.—2,000 feet of Drain Pipes, and Yard Gullies for the six Homes.

Messrs. Eastwood & Co—750,000 Bricks for the six Homes.

Messrs. J. C. Edwards (Ruabon)—9,000 Red Pressed 6 in. by 6 in. Flooring Quarries.

Messrs. Francis & Co.—10 tons of Portland Cement.

Messrs. Greaves, Bull & Lakin—Selenitic Lime for six Homes and service block.

Messrs. Hawkins & Son—One truckload of Greystone Lime.

Messrs. Hilton, Anderson, Brooks & Co.—50 tons of Portland Cement.

Mr. George Jennings (preliminary)—Sanitary Fittings for one Home.

Messrs. Thos. Lawrence & Son (Bracknell, Berks)—25,000 Red-facing Bricks, and 500 feet of Moulded Bricks.

Messrs. Wm. Lee, Son & Co.—25 tons of Portland Cement and 50 yards of Lime.

Messrs. Macevoy & Holt (North Fleet)—50 tons of Cement.

Messrs. Maw & Co. (Shropshire)—250 yards super. Tiling for paving.

Messrs. Rugby Portland Cement Co. (Rugby)—one truckload of Portland Cement.

Messrs. Sharpe, Jones & Co. (Dorset)—1,800 feet of Pipes for Rain-water Drains.

Messrs. Stanley Bros. (Nuneaton)—250 yards of Tile Flooring for one Home.

Mr. Jabez Thompson (Northwich, Cheshire)—1,000 Patent Brickwoods.

Messrs. Towers & Williamson (Grantham)—Clinkers for workshops and stable floors.

Messrs. G. Tucker & Son (Loughborough)—Chimney Pots for all six Homes.

Messrs. Twyfords—The Sanitary Fittings for one Home.

Messrs. Geo. Woolliscroft & Son (Hanley)—The Roofing Tiles for one House.

The following donations have already been promised in the Clayworking Section :—

	£	s.	d.
The Burham Brick Co., Ltd. (per W. Porter, Esq.)	100	0	0
Mr. H. Greville Montgomery	25	0	0
Messrs. Woodward & Co.	10	0	0
Messrs. J. H. Sankey & Son	10	0	0
Mr. J. B. Tombleson (Barton-on-Humber) ...	5	0	0

RENAISSANCE PLASTERWORK.

AT a recent meeting of the Edinburgh Architectural Society, Mr. Harold Tarbolton lectured on the "Plasterwork of the Renaissance and its Subsequent Phases." He said that in the reign of Henry the Eighth there was a large influx of craftsmen from Italy and Germany, and it required about a hundred years for the fusion of the foreign and home ideas. Some fine examples of this period were recorded in the Palace of Nonesuch and the Broughton Chapel. After the death of their patron, Henry the Eighth, the Italians became unpopular, partly on account of religion, and left the country. In the reign of Elizabeth, large numbers of German and Dutch craftsmen settled down in England. Examples of the German style are to be found in many Elizabethan mansions, and are noted for their intricacy of detail. The East of Scotland is very rich in old plasterwork, in which there is strong evidence of German, Dutch, and French influence. Inigo Jones introduced the German style into his work to a great extent. Mr. Tarbolton made a few remarks upon the methods of work in plastering. In earlier years the lime was tempered by burial in the earth for several years before being used, and it is more than probable that some ingredient was also added for this purpose. Most of the work was done *in situ* and not cast. The best material at the present time for executing plasterwork *in situ* was Parian cement mixed with a small quantity of sand. In conclusion the lecturer said that it was most important that the designer should have a thorough practical knowledge of the work, and should be capable of handling the tools, as the effect of good craftsmanship was often lost in bad design.

AN IMPROVED BUILDING BRICK.

MR. D. GRIFFITHS, of Granville House, Pontypool, has been granted a patent for an improved building brick, of which the following is a brief description. The stretchers have a channel running longitudinally through them, while the headers have two channels running transversely through them. Used in conjunction, these bricks enable a wall to be built with a series of continuous channels running longitudinally through it, while presenting a solid exterior—solid bricks of course being used at the quoins. Should the bricks be used for plastering purposes, either for inside or outside work, the channels could be so arranged as to form a key for the cement, stucco, or plaster. The advantages claimed for these bricks are: weight is considerably lessened without reducing the dimensions; cost of transit is reduced from 18 to 20 per cent.; from 18 to 20 per cent. more bricks may be made with the same material as is now employed; cost of drying the bricks is much reduced; while burning in the kilns the fire passes through the interior of the bricks which are throughout burnt harder and more uniformly, and therefore possess better damp-resisting properties than is possible at present. A series of channels helps to intercept the damp and make the walls damp-proof.

These bricks are made by wire-cut machines, which may be fitted up at a nominal cost with the necessary cores for forming the channels.

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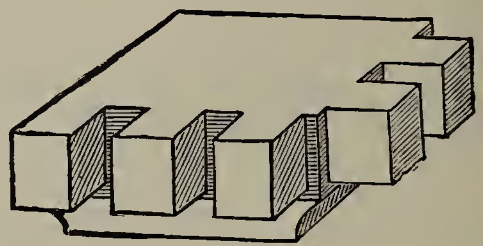

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